Oil in Water Analyser Utilization Experience

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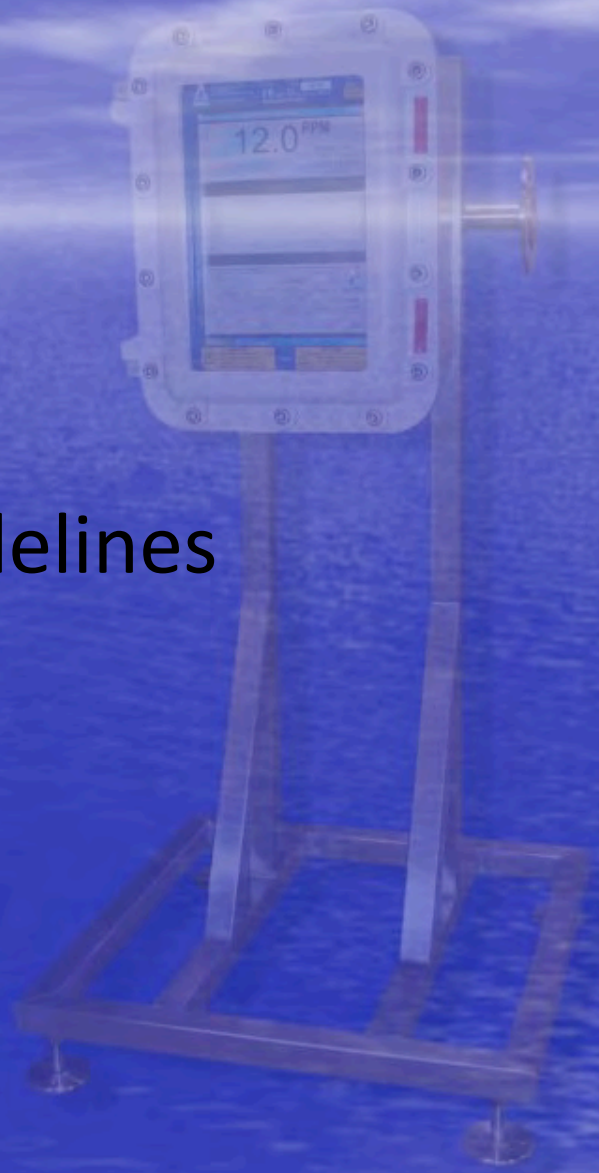
The Challenges

- Fouling
- Chemical Interference
- Analyser & Lab Correlation
- Selecting an Analyser - Guidelines



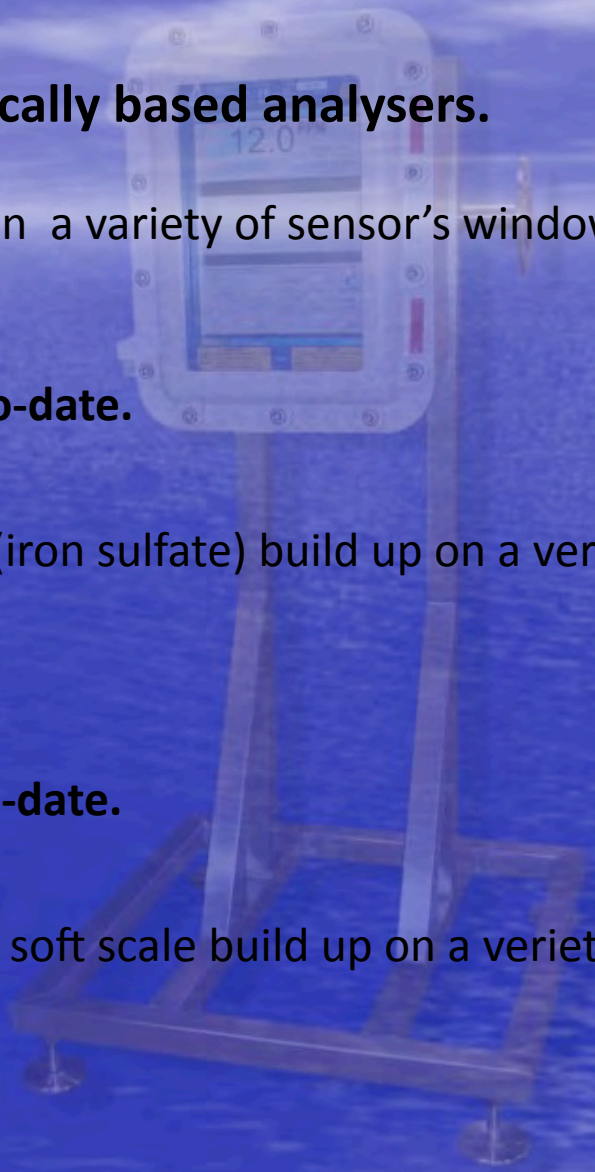
Fouling

The fouling of the sensor window/s affects all optically based analysers.

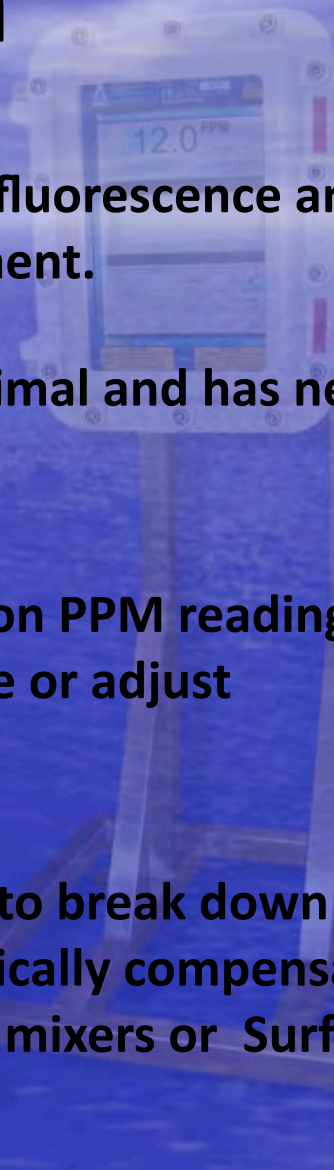
Talisman use of analysers have suffered from a fouling on a variety of sensor's windows.
Noticeable effects in less than 1 hour.
An EX1000 was installed September 2005.
Zero cleaning required following 24 months of service to-date.

Chevron use of analysers have suffered from "schmoo" (iron sulfate) build up on a veriaty of sensor's windows.
Noticeable deposits in hours.
Two EX1000's installed in December 2006.
Zero cleaning required following 22months of service to-date.

StatoilHydro use of analysers have suffered from Heavy soft scale build up on a veriety of sensor's windows.
Noticeable deposits in hours.
EX1000's installed January and July 2007.
Zero cleaning required following 21 months of service to-date.



Oil Droplet Size Variation



- **Oil Droplet size variation directly affects the level of fluorescence and un-checked directly affects the resulting ppm measurement.**
- **In many applications Oil droplet size variation is minimal and has negligible affect.**
- **Where oil droplet size varies significantly, the affect on PPM reading is drastic unless the analyser can control oil droplet size or adjust accordingly.**
- **The EX100 and EX1000 periodically uses ultrasonic's to break down the oil droplets to a standard size, so the analyser automatically compensates for the variation in droplet size. There is no requirement for mixers or Surfactants to reduce oil droplet size.**

Fouling & Oil Droplet Size Adjustment
Ultrasonic Cleaning and Homogenization Video

Chemical Interference

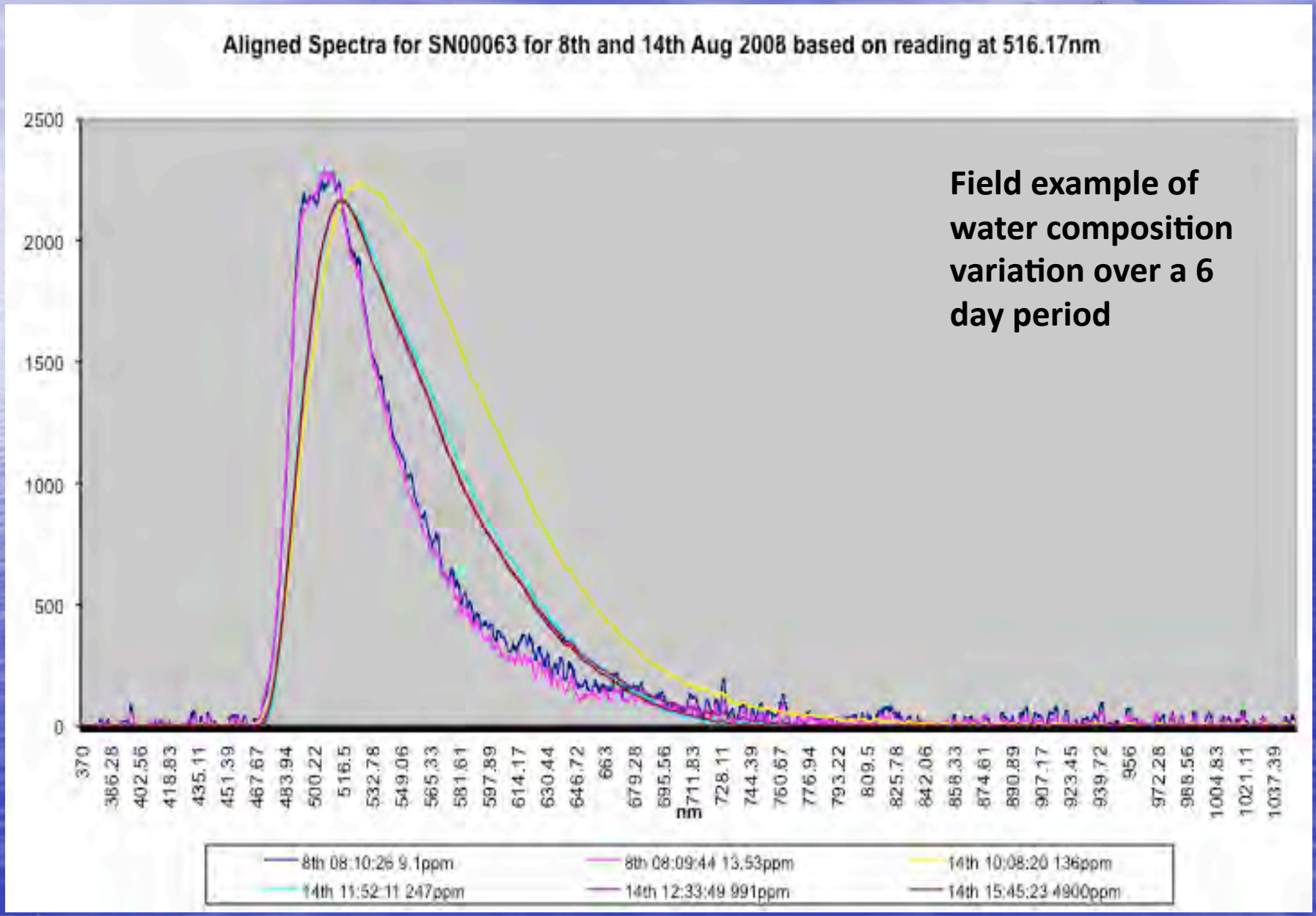
Many process chemicals fluoresce, and many fluoresce more than oil.

The fluorescence of chemical additives can swamp the fluorescence of oil in certain parts of the optical Spectra, creating a false high ppm reading

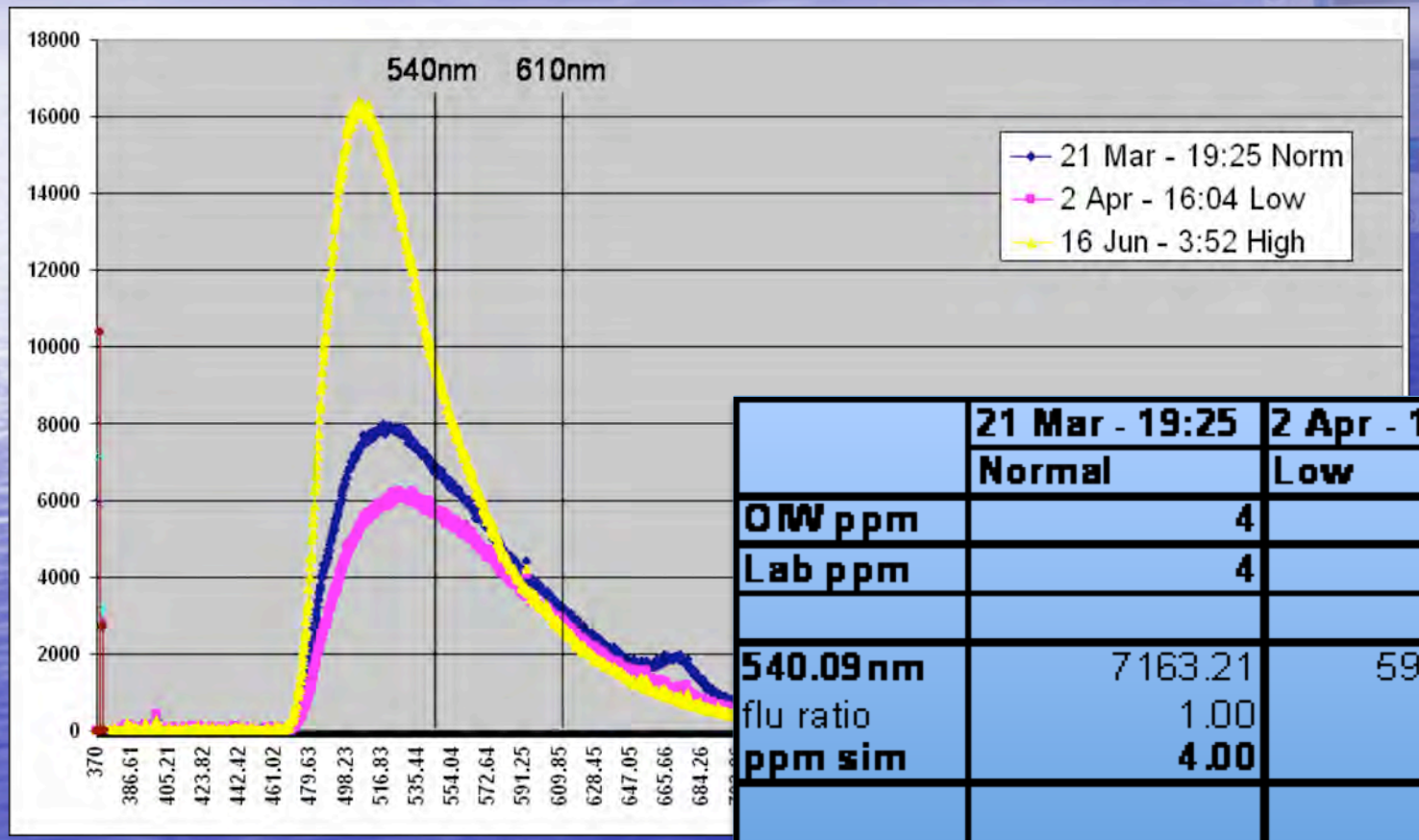
The affects of process chemicals following retuning of the analyser

Chemical	Typically	Concent'n	Before	After
EC1110A	Corrosion inhibitor	42 ppm	15ppm	1.2ppm
EC2176A	Demulsifier	9 ppm	7.2ppm	0.6ppm
EC1188A	Heating medium Cl	0.60 ppm	0.0ppm	0.0ppm
EC1442A	Corrosion inhibitor	45 ppm	6.2ppm	0.0ppm
EC9021A	H2S scavenger	73 ppm	6.9ppm	0.0ppm
EC6354A	Coagulant/de-oiler	100 ppm	0.0ppm	0.0ppm
EC1470A	Corrosion Inhibitor	100ppm	6.5ppm	0.7ppm
Methanol		100%	16ppm	0.0ppm
Meg		100%	12pm	0.0ppm

Chemical Interference



Interference - example



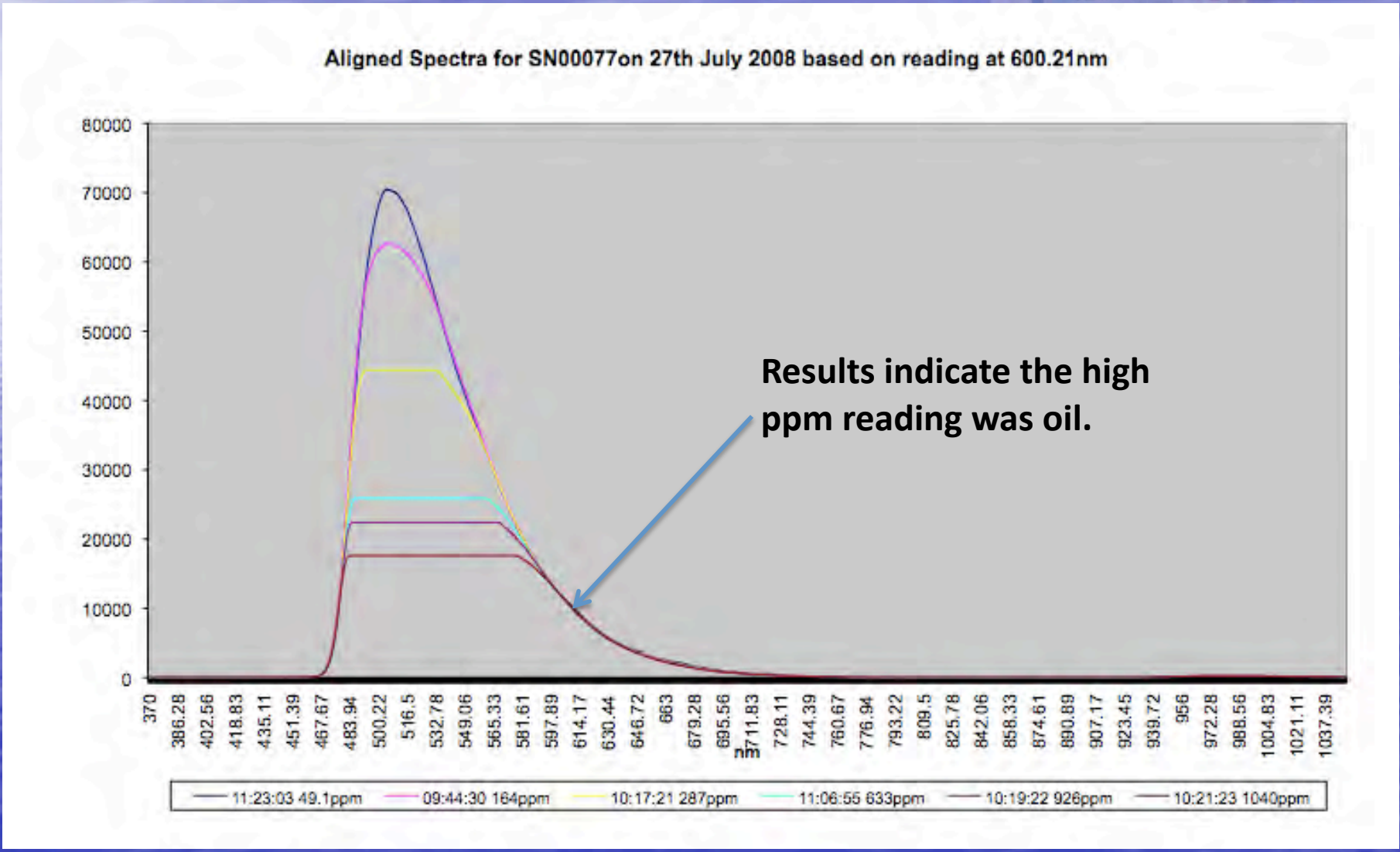
Recent analysis at Talisman Flotta Terminal

	21 Mar - 19:25	2 Apr - 16:04	16 Jun - 3:52
	Normal	Low	High
OW ppm	**4**	**2**	**6.8**
Lab ppm	**4**	**4**	**4**
540.09 nm	7163.21	5914.15	10386.42
flu ratio	1.00	0.83	1.45
ppm sim	**4.00**	**3.00**	**6.20**
610.18 nm	3245.67	2859.09	2724.49
flu ratio	1.00	0.88	0.84
ppm sim	**3.80**	**3.40**	**3.30**

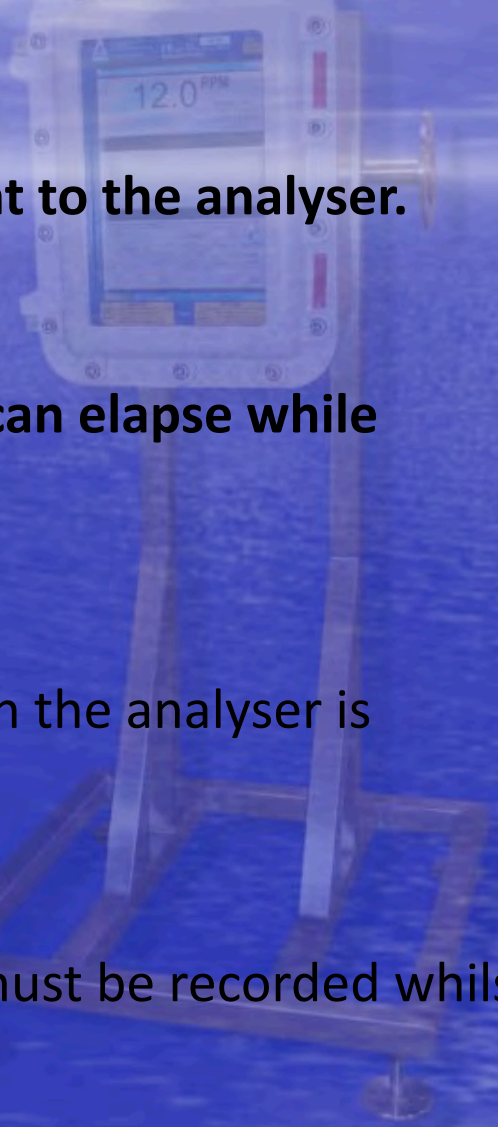
Chemical Interference –

Evaluating Water Composition

Concern that high ppm (>1000ppm) was a process chemical effect.



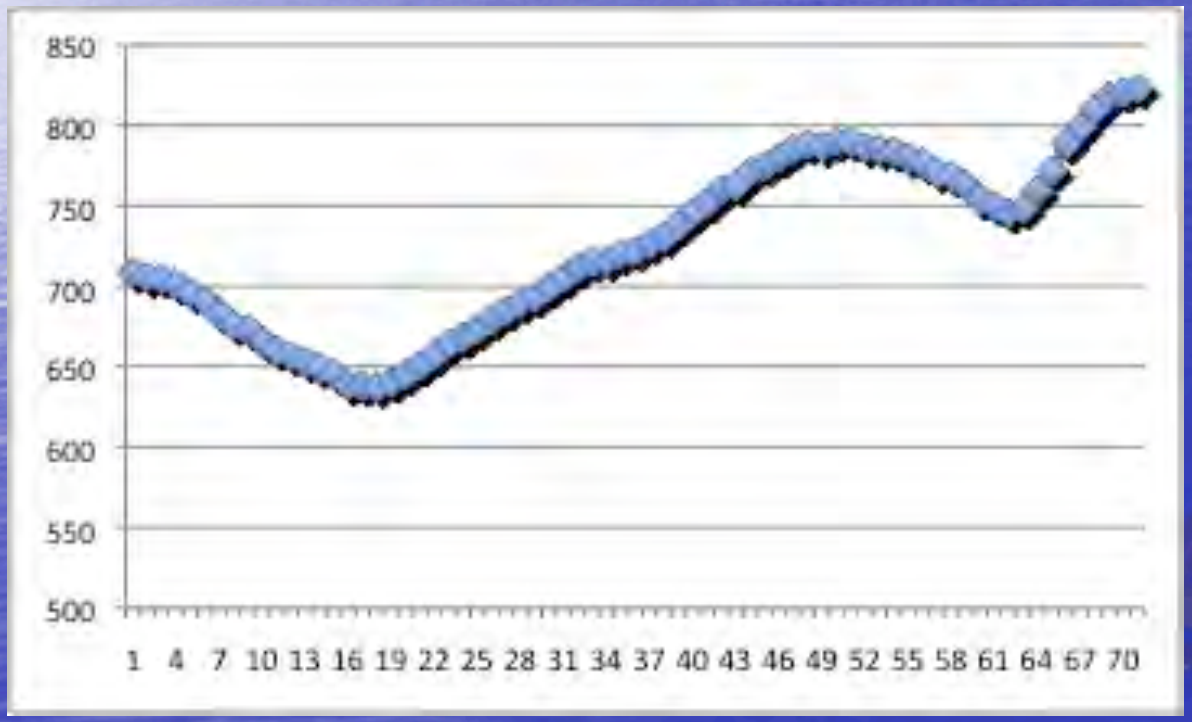
Improving Analyser & Lab Correlation



- **Sample Take-off proximity**
  - **The ideal location to draw a sample adjacent to the analyser.**
- **Drawing The Sample**
  - **Depending on flow and pressure 2minutes can elapse while drawing the sample.**
- **In very stable conditions,**
  - a quick glance at the ppm levels displayed on the analyser is enough to take a reading.
- **In rapidly fluctuating conditions**
  - multiple measurements from the analyser must be recorded whilst the sample is being drawn.

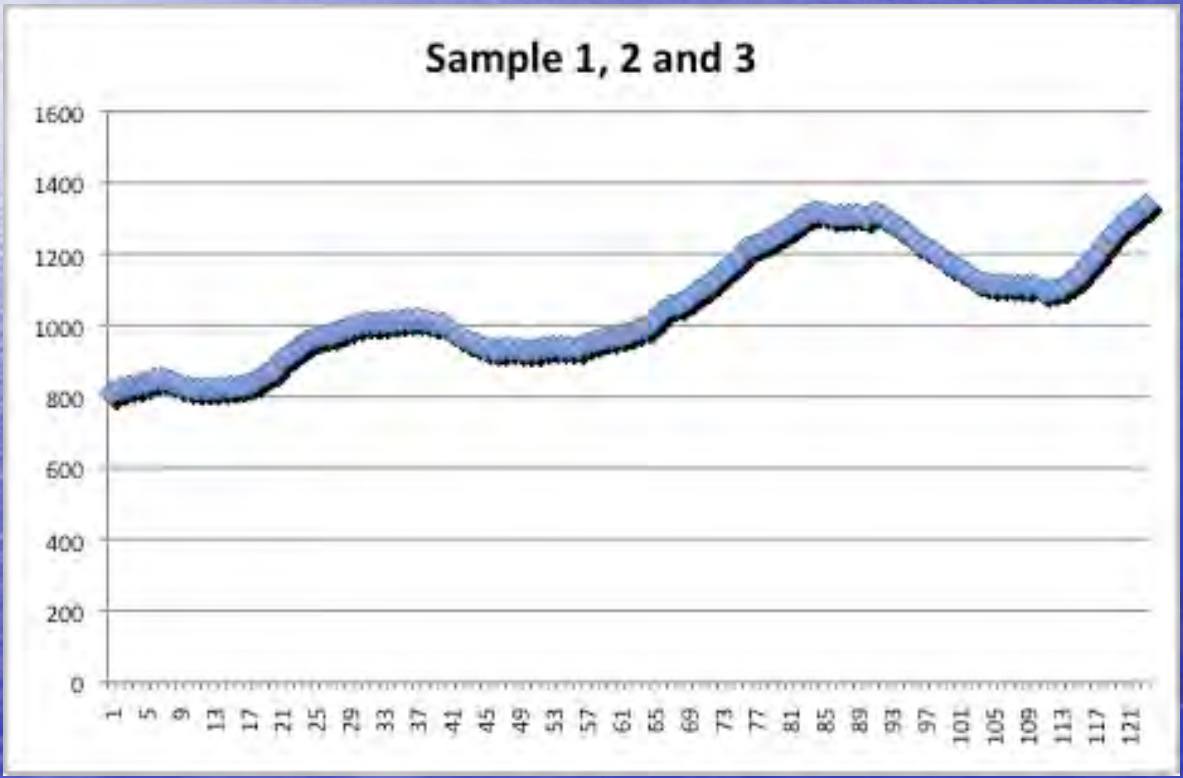
Sample Duration and Relevance

- The EX1000 takes measurements every sec.
- In this example **70 seconds** had elapsed in drawing the sample.
- The measurements ranged from **637ppm** to **823ppm**
- The average reading from the analyser data was **725ppm**
- The laboratory was **758ppm**



Importance of a Control Sample

- The accuracy and repeatability of the laboratory is critical when trying establish alignment of the analyser to the lab.
- A control sample is necessary in evaluating the above.
  - E.g Draw on large sample, mixed thoroughly and divide into three sample bottles.
- Results from a recent installation:

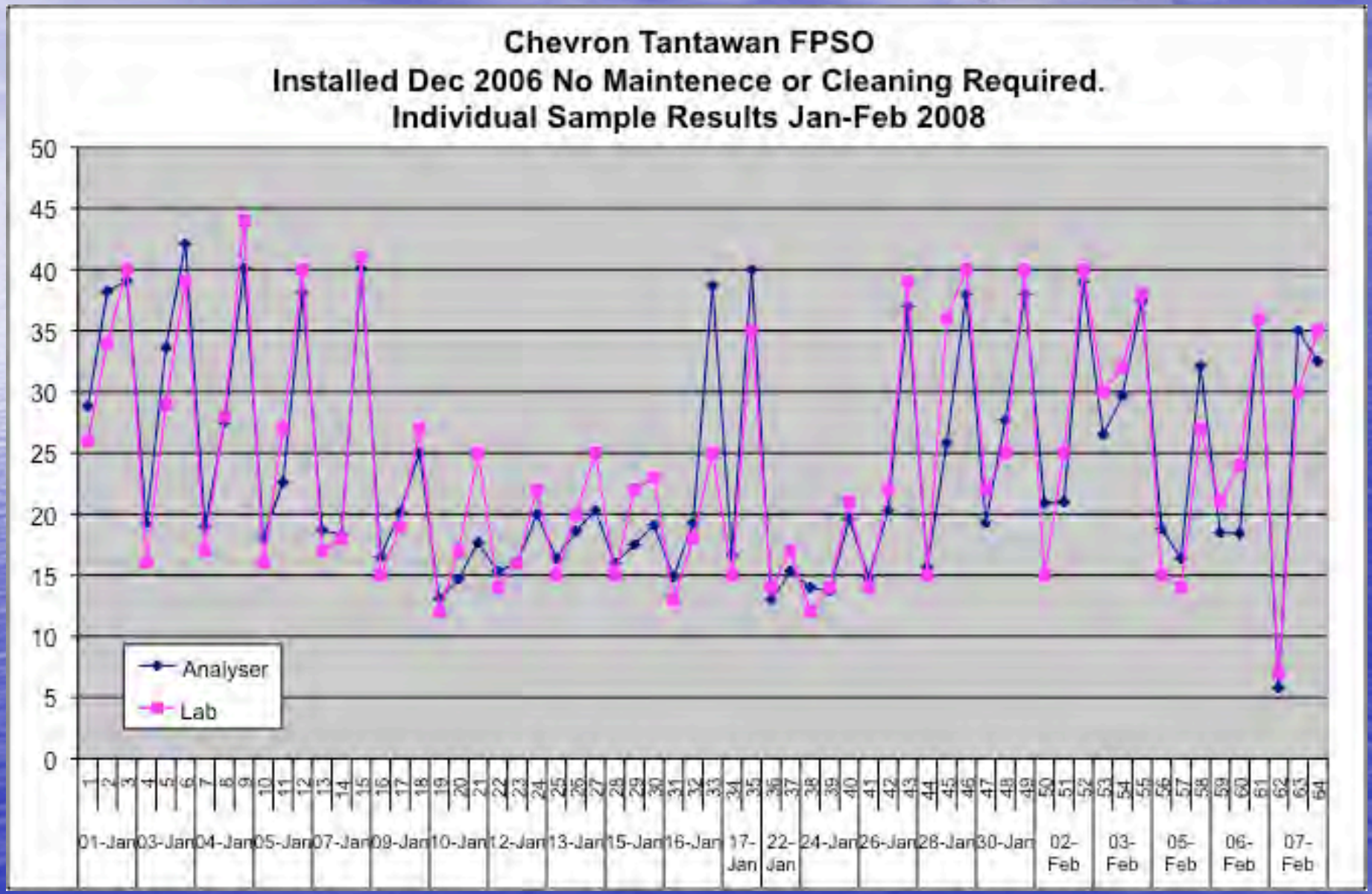


Analyser result Avg
1056ppm

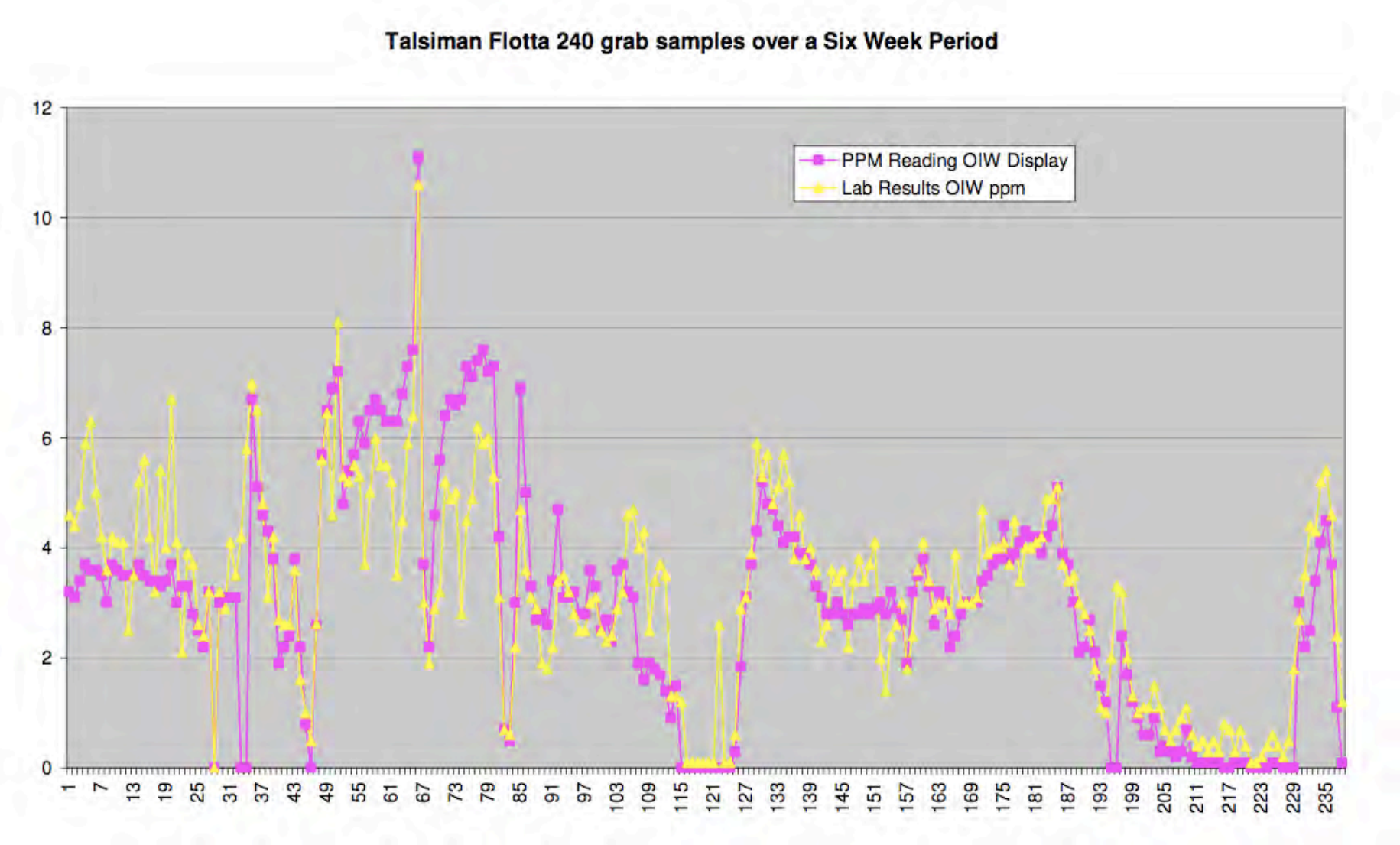
Lab results were
1. **469ppm**
2. **1269ppm**
3. **933ppm**

300% variation for the same sample!

Chevron Tantawan

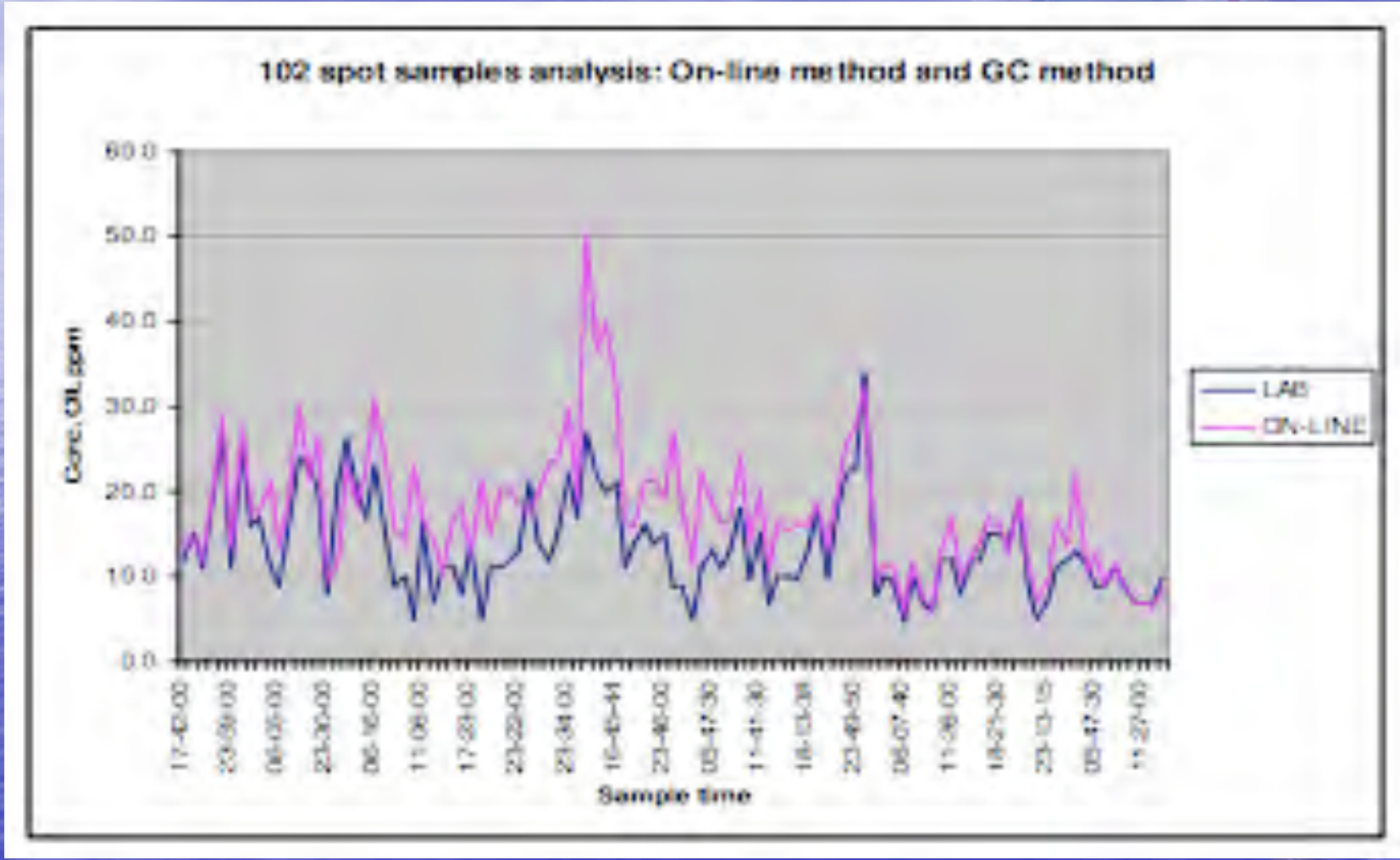


Talisman Flotta



Statoil Hydro

StatoilHydro



Summary Results & Current Status

Previous Experience

Company	Application	Analysers Used*	Fauling	Blocking	Chemical Interferance	Maintenance Interval	Measuremant correlation to Lab
Chevron	Discharge	Various	Yes	Yes	Yes	Days	Process Dependant
Talisman	Discharge	Various	Yes	Yes	Yes	Days	Process Dependant
Statoil Hydro	Discharge & P.Mgm't	Various	Yes	Yes	Yes	Days	Process Dependant

Current Experience

Company	Application	Replacement Analyser	Fauling	Blocking	Chemical Interferance	Maintenance Interval	Measuremant correlation to Lab
Chevron	Discharge	EX1000	None	None	None	None	Consistant
Talisman	Discharge	EX1000	None	None**	None	None	Consistant
Statoil Hydro	Discharge & P.Mgm't	EX1000	None	None**	None	None	Consistant

Chevron - Have already reduced grab sample frequency.

Talisman – Preparing a program to stop using grab samples

Statoil Hydro - Re-initiated program to replace grab samples

Selecting an Analyser - Guidelines

- **Range:**
- **Maintenance Requirement:**
- **Cleaning Requirement:**
- **Blocking:**
- **Chemical Interference:**
- **Sample Pressure Variation:**
- **Flow Variation:**
- **Gas Bubble interference:**
- **Solids Interference:**
- **Wetted Part Materials:**
- **Remote Connectivity and Support:**
- **Remote alarming:**
- **Data logs:**
- **User Interface:**
- **Water Composition:**
- **Proof of Performance:**
- **Hazardous Environment:**

Ask these questions From Customer References

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