

TURNER DESIGNS
Hydrocarbon Instruments



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Topics for Discussion

- ◆ Brief Company History
- ◆ UV Fluorescence
 - Detection Capability
 - Range
 - Hydrocarbon Types
- ◆ Boiler Feed Water Issues
- ◆ Hydrocarbon Sources
- ◆ Potential Cost Saving
- ◆ Other Applications

Abstract

- ◆ New Fluorescence Oil in Water Monitor
 - Proven Technology
 - Low Cost
 - Low Maintenance
- ◆ New sources of water
 - From Cooling or heating Loops
- ◆ Recover Energy
- ◆ Reduce sewerage costs
- ◆ Reduce Pretreatment costs

Who are we?



- ◆ Leader in Continuous On-Line and Benchtop Oil in Water Monitoring
- ◆ 15 Year History of application installations
- ◆ Turner Designs Hydrocarbon Instruments – Incorporated Feb 2002

Some Users

- ◆ Xcel Energy – Comanche Power Plant
 - Lube Oil Coolers
- ◆ Florida Power & Light
 - Multiple locations
 - Fuel oil in steam condensate return
 - Cooling water discharge
- ◆ Hawaiian Electric
 - Multiple Locations
 - Cooling Water discharge
- ◆ Armstrong Services

What is Fluorescence?

Most petroleum based Oils and Fuels absorb UV light and spontaneously emit fluorescent light at longer wavelengths.

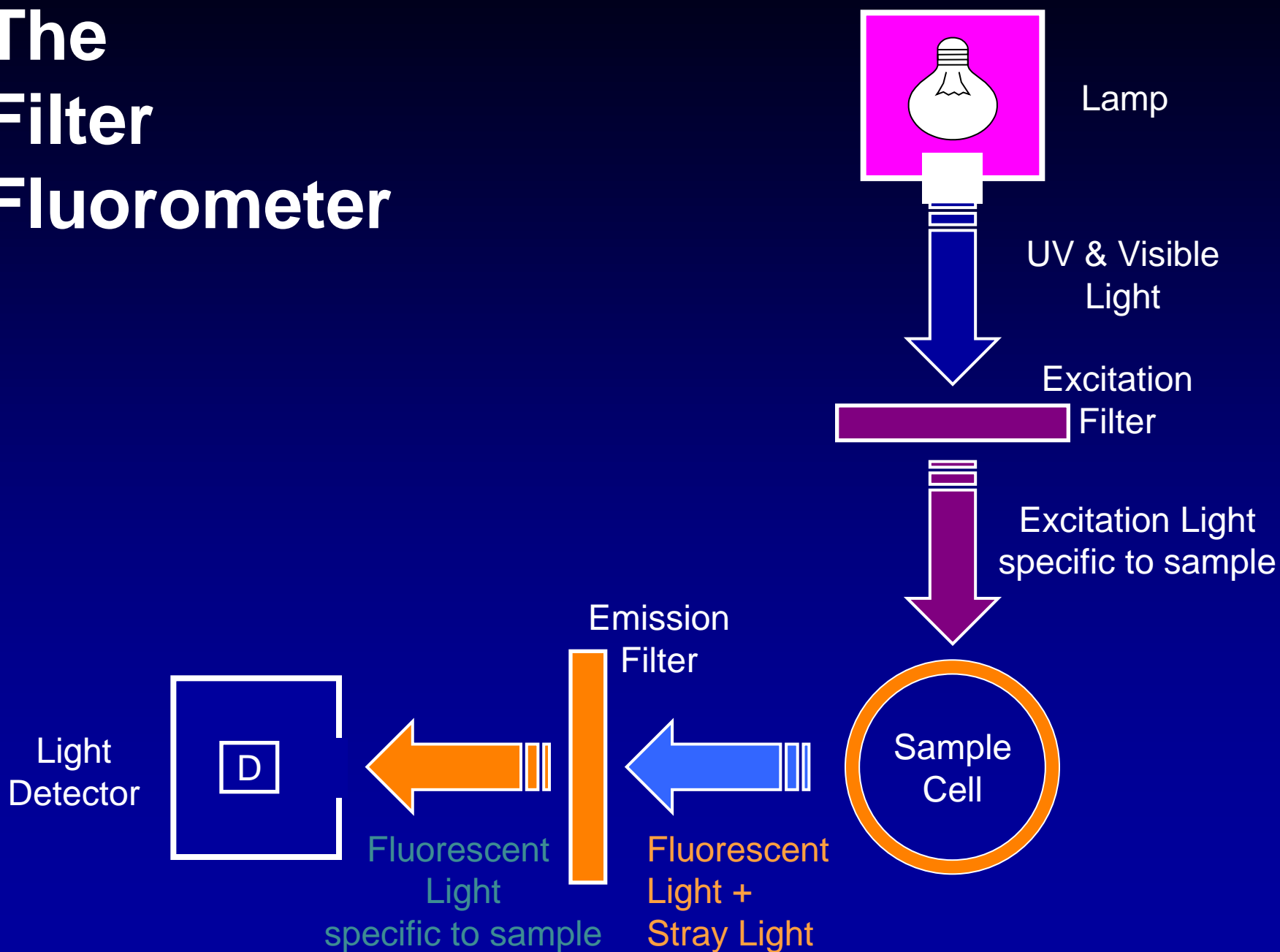
- ◆ Fluorescence light intensity is linear with hydrocarbon concentration
- ◆ More sensitive than UV Absorption, VIS, and IR
- ◆ Can detect free, emulsified and water soluble oil (WSO's)
- ◆ Low Turbidity effects
- ◆ Readings can correlate to TPH or TOG
 - Different than TOC
 - Oil in Soils and on Metals



Sample Fluorescing



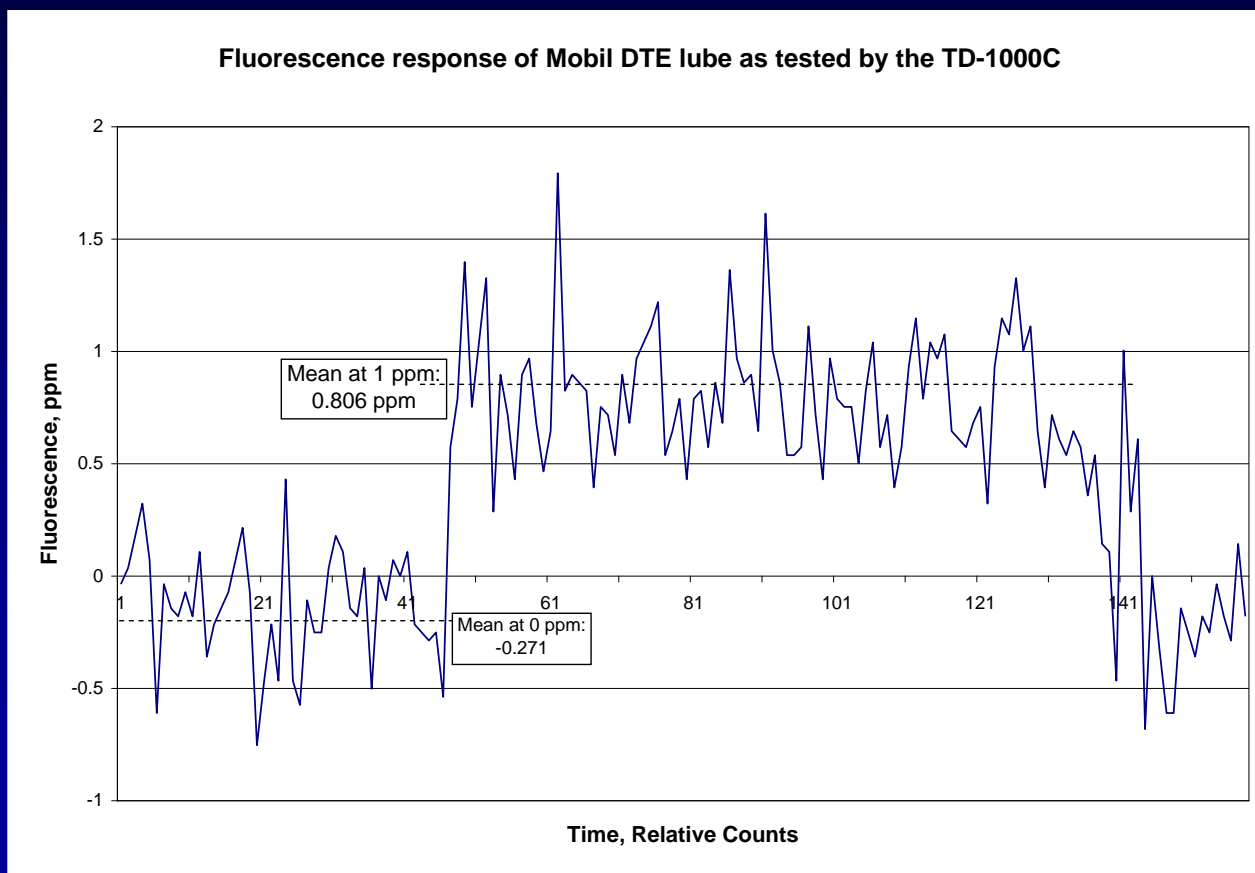
The Filter Fluorometer



Typical Detection Limits

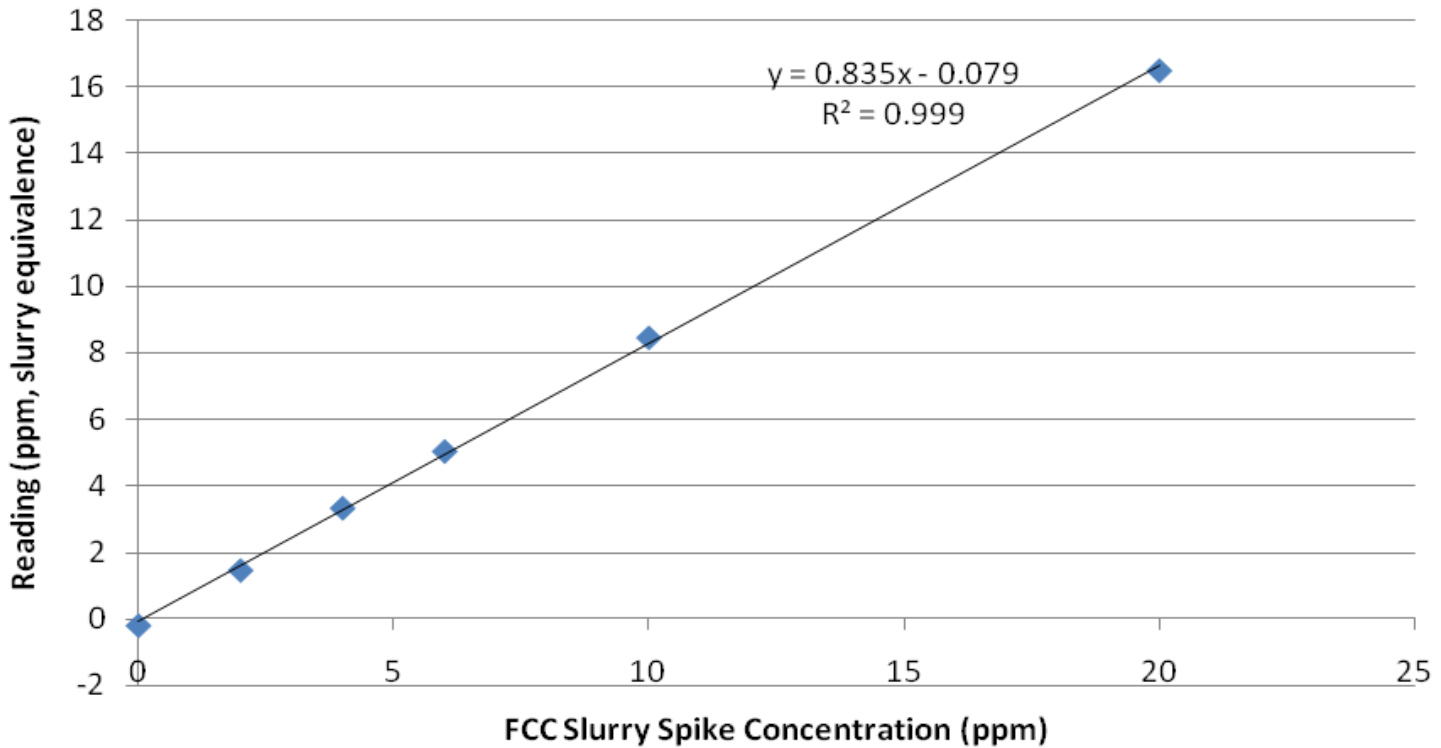
- ◆ Each oil type and water source is slightly different
- ◆ Heavy Fuel Oil in Steam Condensate
 - As low as 5 Parts per Billion
- ◆ Lube Oil in Steam Condensate
 - 50 – 500 Parts per Billion
- ◆ Transformer Oil in Steam Condensate
 - 100 – 500 Parts per Billion
- ◆ Hydrocarbon in Cooling Water
 - Depends on source
 - Ground Water
 - River Water

Detection of Mobil DTE 797



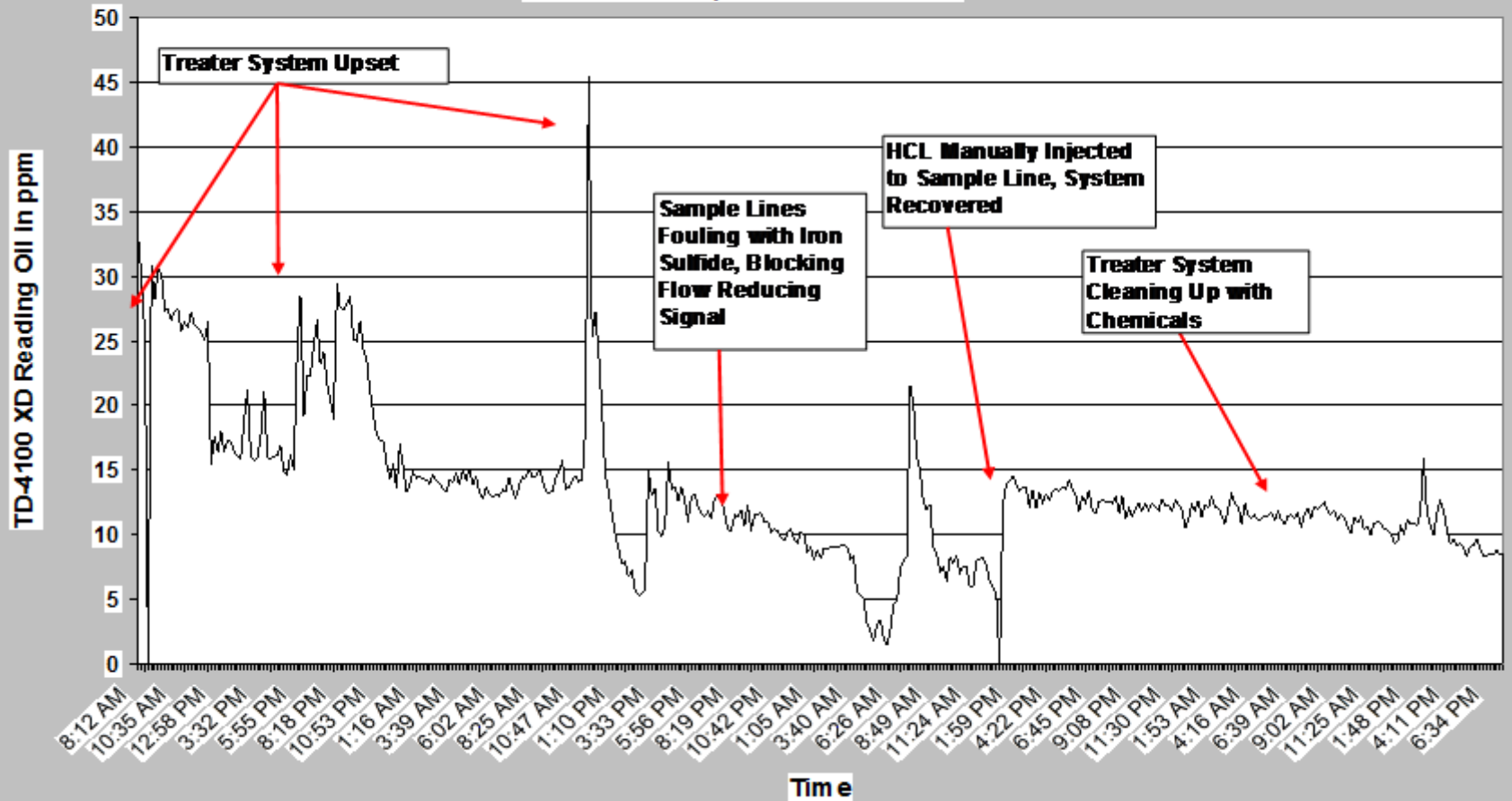
Linearity Check

TD-3100, 300-400EX/410-600EM



Continuous Monitor Value

TD-4100 XD Performance vs Time
Offshore Gulf of Mexico
April 03



Hydrocarbon Types

- ◆ Aromatic Hydrocarbons will fluoresce
- ◆ Can measure non-aromatic hydrocarbons with some aromatic content
 - Most lube oils will have 5 – 30% aromatic additives
- ◆ Fluorescent oil soluble dye addition if needed

ASME Boiler Feed Water suggestions

- ◆ <0.2ppm Oily Matter
 - Up to 1ppm for low pressure
- ◆ Oil Content causes
 - Foaming conditions
 - Carry over to turbines
 - May cause sever damage
 - Coking of tubes
 - Hot spots / leak potentials
 - Most dangerous contamination potential

Oil Sources

- ◆ Fuel Oil Heater loops
- ◆ Bering Oil Coolers
- ◆ Transformer Oil Coolers
- ◆ Lube Oil Coolers
- ◆ Cooling Water source
 - Surface water contamination
 - RO filter damage



Methods to prevent contamination

- ◆ Don't mix boiler feed water with potentially contaminated water
- ◆ Keep water pressure higher than oil
- ◆ Dump water to sewer when used to cool oils
 - NPDES permit needed

Boiler Feed Water Make Up savings

- ◆ Boiler Feed make up 10 – 20% of water
 - Up to 70% for plants that use steam
 - Food Processing
- ◆ Midsized plant uses 40,000 pounds of steam
 - Water purchase
 - Water Sewering
 - Energy Savings
- ◆ \$130,000 / year

Continuous Monitoring will detect leaking heat exchangers early



OTHER APPLICATIONS

- ◆ Industrial Waste Water
 - Sump Water Monitoring
 - Continuous measurement for upsets
 - Control discharge system
 - Destination
 - Polishing filter
 - Reduction of compliance issues
- ◆ Intake Protection
 - Prevent issues from other's sources





Thank you for the opportunity and
your time.

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