GOM West Area Operations

SS181B Produced Water System Oil-in-Water Monitors – Advanced Sensor Model EX-1000

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Applying Existing Technology
AGAR Probes & Oil in Water Monitors

- **Interface Alarm (AGAR)** – Detects loss of oil/water interface
  - Prevent carry-over of oil to water treatment system.
  - Provides leading indicator so operator can take appropriate action to prevent water treating system upsets (spills, sheens, etc).
  - GOM West – Campaign underway to install probes in vessels with interface control (oil treaters, separators).

- **Oil-in-Water Monitor** – Tiger Shoal & SS-181 B – On-line measurement of oil in water concentration in PPM.
  - Multiple monitors installed to measure performance of water treatment system.
  - Provides leading indicator of system upset so operator can take appropriate action to prevent sheens, spills, etc.
Two OiW (oil-in-water) Monitors Commissioned 10/9/10

One Unit, Dual-Stream, Monitors Skimmer Inlet and Skimmer Outlet

Valves cycle inlet and outlet water streams through the unit – currently set for 15 minute cycles
SS181B- On-Line OiW Monitor
Advanced Sensor EX-1000

• One unit monitors overboard water from flotation cell
• Both units take one reading per second
• Both units use ultrasonics to keep optics clean and operable
• Alarm currently set at 29 PPM
SS181B- On-Line OiW Monitor
Flotation Cell Outlet
SS181B- On-Line OiW Monitor
Advanced Sensor EX-1000

- Two OiW monitors used to monitor the produced water system
- Both units very accurate, reliable and are self-cleaning
- Daily PPM readings taken by Operations match on-line monitor readings
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- Two independent monitors accurately trend changes in the produced water system

![Graph showing water system trends with green and blue lines indicating skimmer outlet (flotation cell inlet) and flotation cell outlet, respectively.]

Green - Skimmer Outlet (Flotation Cell Inlet)
Blue - Flotation Cell Outlet
SS181B On-Line OiW Monitors
Summary/Next Steps

- Implement next level of technology deployment in other core fields in West Area Operations (EI 252, SMI 236 etc).
- Increase on-shore process monitoring and control, moving away from off-shore performance monitoring
- Reduce Sample Testing
- Move from side stream switching measurements, to in-line simultaneous measurements.
- Reduce OpEx / CapEx: Adjust process variables and reliably measure results with a view to process improvement, no off-shore operator intervention
- Deepwater: 10 PPM overboard target
SS181B On-Line OiW Monitors
Summary / Conclusions

- Proven technology, endorsed by CVX SME – To date, has proven to be very reliable, accurate and self-cleaning.
- Calibrate once per year; no maintenance.
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