Application of Real-Time Monitoring to Offshore Oil and Gas Operations

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Does your company use real-time monitoring for its offshore operations? If not, why?

- Yes, Murphy uses real time monitoring for offshore operations, worldwide
- Murphy uses RTM to expedite information exchange between rig and non-rig support personnel
- RTM technologies allow data streams to be viewed and analyzed by a wide variety of support personnel and in Murphy's view are proven to enhance decision making
- Real time data are continuously available, continuously recorded, and are referred to on a continual basis
- Murphy does not use a dedicated central RTM facility with 24/7 staffing. In most situations, Murphy's operational model and business model do not support requirement for a dedicated facility.
- In the event of a major incident response situation, Murphy can access 24/7 RTM through our well containment common operating platform to obtain real time data (ROV feeds, pressure data, vessel positions, weather, etc.) at the containment response location.

If your company does use real-time monitoring, what are the critical operations and specific parameters that your company monitors?

- **Murphy monitors essentially all mud logging and logging while drilling data streams. Mud loggers use WITSML technology to integrate data from multiple sources, including but not limited to:**
  - Drilling parameters (PVT, WOB, RPM, WOB, torque, flow-in/flow-out, ROP, ECD, mud density in/density out, etc.)
  - Formation evaluation parameters (Resistivity, GR, Density/Neutron, etc.), gas levels, etc.

- **On certain exploration wells, Murphy uses real time pore pressure and PP-FG window analysis and monitoring**

- **On certain development wells, Murphy uses a real time monitoring center provided by the fracturing contractor to monitor fracturing operations**

- **Murphy's drilling contractors and some service companies variously monitor blow out preventer controls & status, equipment condition, maintenance status, and other parameters from their operational bases**

Do you believe there are specific types of wells or operations and parameters (for drilling, completions or workovers, or production operations) that always should be monitored with real-time monitoring?

- The business case should drive the decision whether to use RTM and to what level of detail RTM will be used and monitored
- Murphy uses at least some RTM tools for all offshore drilling operations, regardless of location
- Murphy generally does not use RTM for completion or workover operations, except as noted previously
- Murphy generally uses RTM for onshore drilling operations, but at a lower detail level than offshore

Are there specific criteria or risk thresholds that your company uses to prompt real-time monitoring requirements (e.g. factors such as well or water depth, frontier area, HP/HT wells, or well complexity)?

- There are no specific criteria in Murphy policy
- As discussed previously, decisions are prompted by the business case
- Murphy considers the business case sound to use continual monitoring for most offshore drilling and some onshore drilling operations
- Murphy does not consider the business case sound to use continuous monitoring at a 24/7 facility

Does your company rely on any automation and predictive software in real-time monitoring?

- Murphy generally does not use automation nor predictive software
- Predictive software is used only for pore pressure and mud window analysis on certain wells as previously discussed. This real time model is used as only one of several tools in evaluating this critical parameter.

What role could automation and predictive software tools play in real-time monitoring?

- **In Murphy's view, automation and predictive software should play a very limited role because:**
  - Variability of the downhole environment requires highly skilled onsite personnel of multiple disciplines to continually evaluate changing parameters, compare observations and experiences, and adjust actions to maintain safe and efficient operations
  - Data streams are unreliable
  - The remote view is necessarily incomplete
  - Existing technology is insufficient

- **In Murphy's view current automated technologies are not applicable to this environment**

- **In fact, Murphy is concerned that excessive reliance on automation, remote tools, or remote monitoring would dilute the authority of the site supervisors and lead to distractions, confusion and misinformation that could actually reduce safety of the operation**

What role could condition-based monitoring play in real-time monitoring? Describe how operating equipment using condition-based monitoring could be tailored and/or used for real-time monitoring.

- Drilling contractors are doing condition based monitoring for their engines, BOP's, DP systems, and other critical equipment.
- Some of these systems already have the capability for onshore support to be able to access data logged in the field and trouble shoot issues when required

How could BSEE leverage such technologies?

- We see no practical way for BSEE to leverage condition based monitoring
- Contractor and OEM personnel have the expertise to use condition based monitoring data to manage and maximize the performance and safety of their equipment
- BSEE, at this time, does not have the necessary experience to leverage the technologies

Which activities could real-time monitoring supplement or replace?

- Conceivably, BOP witness testing is one area where Murphy could support BSEE implementing RTM as a replacement for on-site witness testing. Conceivably, the IPT software could be modified to allow RTM access to the see the data.
- There are several issues, most notably with accurate recording of all valve positions, remote understanding of activities on the testing pump / unit, and the like
- It should be noted that industry attempts to achieve this goal have been both costly and generally unsuccessful to date
- Would have to address issues with security and access to the data

What opportunities do you see for BSEE to use real-time monitoring to provide timely, functional, and value added inspections?

- Some of BSEE inspector activity while on offshore facilities is focused on data collection and data review.
- There could be value in the sense that complete and accurate data recording could be made available for inspector review either when on site or remotely
- That being said, in Murphy's view, there is no substitute for direct hands on site inspection. Inspectors must be on site to effectively identify hazards that might exist.

What would you recommend that BSEE do in the real-time monitoring area?

- Access to rig site data streams does have important value in promoting a safer and more efficient operation
- The current reality is that a very wide range of data streams are currently are being used by most offshore operators, contractors, and service companies on a continual basis
- Each Operator, contractor, or service company will have a different business case for utilization and extent of RTM in their operations
- Murphy recommends that BSEE should abstain from prescriptive rule making in this area

Take Aways

- **A wide range of data streams are currently are being used by most offshore operators, contractors, and service companies on a continual basis**

- **Each Operator, contractor, or service company has a different business case for utilization of and extent of RTM in their operations**

- **Murphy recommends caution with respect to automation and predictive software because trained professionals on site, with supervision and support from resources in town, must make operational decisions based on input data, experience, and informed judgement**

- **Murphy recommends caution with respect to real time remote monitoring and intervention because of the potential to dilute the authority of the site supervisors and lead to distractions, confusion and misinformation that could actually reduce safety of the operation.**

- ***Murphy recommends that BSEE should abstain from prescriptive rule making in this area***