Top 5 Tips for Oil and Gas Corrosion Management

Oilfield and midstream microbiologically influenced corrosion (MIC) can lead to unplanned downtime, health and safety concerns, and decreased asset lifespan. Incorporating microbial data into corrosion management programs can lead to more informed decision making at every step of the process, from MIC diagnosis to prevention and mitigation efforts followed by performance monitoring.

Below are our top tips for incorporating molecular microbiological methods (MMMs) into oil and gas corrosion management programs:

1. **Assemble a team of experts.** Due to its complexity, diagnosing MIC requires interdisciplinary expertise from operators, corrosion engineers, chemists, microbiologists, and material scientists. The project success team at Microbial Insights can help you choose the most appropriate microbial analysis for your system while providing exceptional customer service from assay selection and sample analysis to reporting and interpretation.

2. **Collect multiple lines of evidence to support a MIC diagnosis.** Unfortunately, there's not a single test that can definitively confirm MIC. Instead, a multiple lines of evidence approach is needed. Incorporate operational, chemical, material, mineralogical, and microbial data into your MIC assessment.

3. **Quantify microorganisms and functional genes associated with MIC using CENSUS® qPCR and QuantArray®-MIC.** Incorporate CENSUS® qPCR or QuantArray®-MIC into routine monitoring and begin tracking trends in the microbial data. Increases in microorganisms associated with MIC can serve as an early warning sign, allowing responsible parties to investigate and intervene sooner.

4. **Profile the microbial community using Next Generation Sequencing (NGS).** NGS is a DNA-based technique used to identify the dominant bacteria or archaea in a sample down to the genus level, requiring no prior knowledge of the microbial community composition. NGS provides an overall profile of the microbial community and a more comprehensive assessment of potential MIC threats than is possible with culture-based methods.

5. **Don't forget about sample hold times.** Unlike mineralogical testing, microbial analyses have a short 24 to 48 hour hold time. Overnight shipment at 4°C combined with immediate DNA extraction upon sample receipt at the laboratory minimizes

changes to the microbial community. If samples are being collected from a remote location like an offshore oil rig or an isolated pipeline, on-site DNA extraction using Bio-Extract™ kits can be used to preserve sample integrity over a longer time period.

Bonus Tip

Consider custom assay development. If a microorganism is detected by NGS and is highly correlated with other MIC indicators in a system, Microbial Insights can use this information to design a custom CENSUS® qPCR assay for more targeted monitoring. This strategy has been helpful for multiple clients in the oil and gas industry.[1]

To discuss a project or for more information, please contact Microbial Insights' Project Success Team at 865.573.8188 or info@microbe.com.

[1] Severe corrosion of carbon steel in oil field produced water can be linked to methanogenic archaea containing a special type of [NiFe] hydrogenase, S Lahme, J Mand, J Longwell, R Smith, D Enning. Applied and Environmental Microbiology 87 (3), e01819-20.