



Rapidly detect and quantify specific microbial populations and processes

**CENSUS®** allows facility managers to cost effectively quantify targeted members of the microbial community frequently implicated in microbial induced corrosion (MIC). At an oil and gas production facility for example, quantification of sulfate reducing bacteria (SRB) often responsible for pitting corrosion, could permit a manager to:

- Directly assess the potential for MIC
- Evaluate the effectiveness of biocide treatments and corrosion inhibitors
- Optimize O&M activities

Microbial Insights offers a variety of CENSUS targets to quantify organisms and biological processes responsible, or contributing to, MIC.

#### CENSUS Advantages:

- Accurate — Direct analysis of sample removes the need to grow the bacteria thus eliminating biases associated with traditional approaches (e.g. plate counts and BARTs).
- Specific — Target either the specific bacterial group (e.g. *Archeoglobus* spp.) or a specific gene encoding a microbial process (e.g. sulfate reduction) associated with MIC.
- Rapid — Results are available within days (7-10 standard TAT) \* Rush service available
- Sensitivity — Practical Detection Limits (PDL) are as low as 100 cells per sample with a dynamic range over seven orders of magnitude.
- Flexibility — Analysis can be performed on almost any type of sample (water, pigging debris, corrosion coupons, sediment, soil, Bio-Traps, and others).
- Applicability — CENSUS assays are available for quantification of MIC associated microorganisms for which corresponding traditional assays are not available.



#### Approaches include:

CENSUS is offered in a variety of formats to meet the objectives of your particular project. Please choose from the following:

**CENSUS—Are organisms present that have the potential to cause MIC?**

Our standard DNA based approach provides quantification of bacteria with the genetic potential for MIC.

**CENSUS-Store—What were the baseline results before treatment?**

Collect those valuable points in time and store them for potential future analysis. Allows the collection of more data points at a lower cost. Samples can be stored and processed even years down the road.

**Need the ability to quantify a unique population or function? MI can develop custom CENSUS targets. For more information, please call us at (865) 573-8188.**

**Targets available for a wide range of organisms including:**

- General Groups
- Total Bacteria
- Total Archaea

**Bacterial Groups and Specific Microorganisms**

- Denitrifying (nitrate reducing) bacteria
- Sulfate reducing bacteria (SRBs)
- Methanogens
- Methanotrophs
- Acetogens
- *Geobacter* spp.
- *Archeoglobus* spp.
- Methane oxidizing bacteria
- Ammonia oxidizers
- Anaerobic ammonia oxidizing bacteria (Anammox)

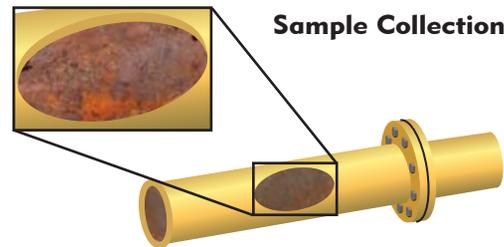
**And more!**

**How does CENSUS work?**

CENSUS is based on a technique called quantitative polymerase chain reaction (qPCR) whereby many copies of a specific gene are generated. As each gene copy is made, a fluorescent marker is released, measured, and used to quantify the number of target genes present in the sample. The gene copied during the process (target gene) is determined by short segments of DNA called "primers" which are added to the reaction mixture. In essence, qPCR is like a copy machine with a counter. The "primers" select which pages (target gene) of the

book (DNA) are copied and the counter keeps a running total of how many pages were copied (number of target genes in the sample).

Traditionally, culture-based methods such as plate counts or most probable number (MPN) analyses have been used to estimate bacterial populations in environmental samples. However, cultivation based approaches detect less than 10% of the targeted bacterial group thus severely underestimating the total population.



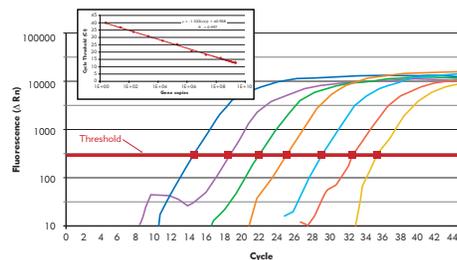
Samples (corrosion coupons, water, soil, Bio-Trap, etc.) are collected and shipped overnight on ice (4°c).

**DNA Extraction**



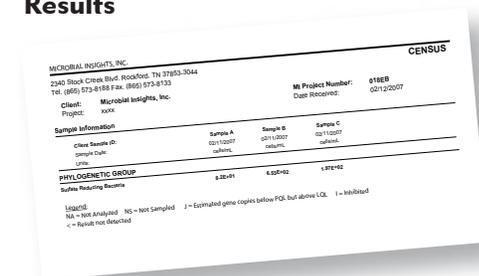
DNA is extracted from samples upon arrival

**Amplification**



Quantitative PCR is used to detect and quantify targets of interest (e.g. sulfate reducing bacteria)

**Results**



Results are emailed to project contact