



Rapidly detect and quantify specific microbial populations and processes

CENSUS® allows site managers to cost effectively quantify targeted members of the microbial community deemed critical for site remediation. At a site impacted by chlorinated solvents like PCE or TCE for example, quantification of *Dehalococcoides* spp. (DHC), a key dechlorinating bacteria, permits project managers to address the following:

- Directly evaluate the feasibility of monitored natural attenuation
- Evaluate the efficacy of enhanced bioremediation approaches
- Assess the need for bioaugmentation

Currently, Microbial Insights offers over 30 targets for a wide variety of functions ranging from reductive dechlorination of chlorinated solvents to BTEX and MTBE biodegradation that can provide direct evidence of the biological processes occurring at your site.

CENSUS® Advantages:

- Accurate — Direct analysis of sample removes the need to grow the bacteria thus eliminating biases associated with more traditional based approaches (i.e. plate counts).
- Specific — Target either the specific bacterial group (e.g. *Dehalococcoides* spp.) or a specific gene encoding a desired function (e.g. reductive dechlorination).
- 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.

Targets available for a wide range of pollutants including:

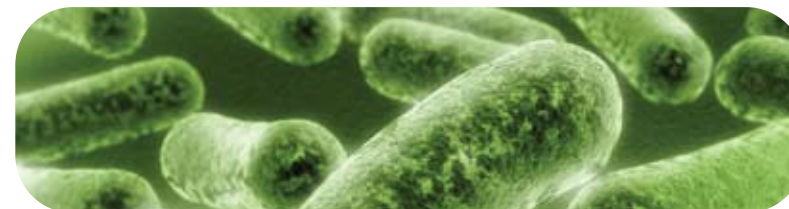
Chlorinated Compounds:

- PCE, TCE, DCE, VC
- TCA, DCA
- PCP
- Perchlorate

And more!

Petroleum Hydrocarbons:

- BTEX
- MTBE
- Diesel
- Naphthalene
- Alkanes



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 degrade...?

Our standard DNA based approach provides quantification of bacteria with the genetic potential to degrade a particular contaminant.

CENSUS®-Expression — Are organisms actively expressing a desired function?

RNA as opposed to DNA is extracted and used to quantify metabolically active bacteria of interest expressing the desired function.

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 your contaminant of concern. For more information, please call us at (865) 573-8188.

Targets available for a wide range of organisms including:

Dechlorinating Bacteria

- *Dehalococcoides*
- *Desulfuromonas* spp.
- *Dehalobacter* spp.
- *Desulfitobacterium* spp.
- And more!

Bacterial groups involved in remedial processes

- BTEX utilizing bacteria
- MTBE utilizing PM1
- PAH utilizing bacteria
- Methanogens
- Sulfate/iron reducing bacteria
- *Geobacter* spp.
- Methane oxidizing bacteria
- Propane oxidizing bacteria
- Denitrifying bacteria
- Ammonia oxidizers
- Acetogens
- Total bacteria
- Fungi
- Anaerobic ammonia oxidizing bacteria (Anammox)
- And more

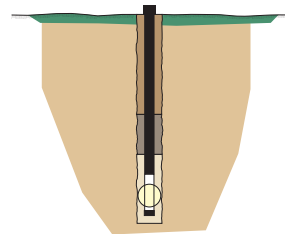
How does CENSUS® work?

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.

Sample Collection



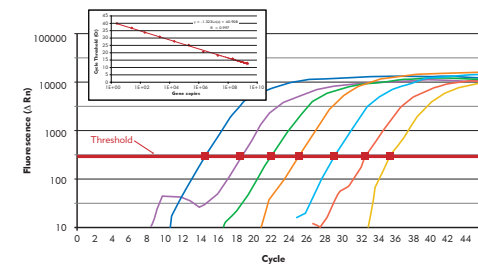
Groundwater, soil, or Bio-Trap® Sampler collected and shipped overnight on ice (4°C)

DNA Extraction



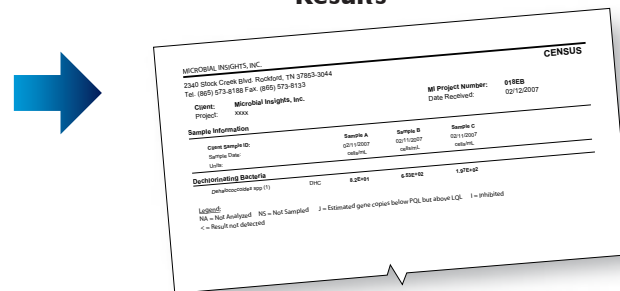
DNA is extracted from samples upon arrival

Amplification



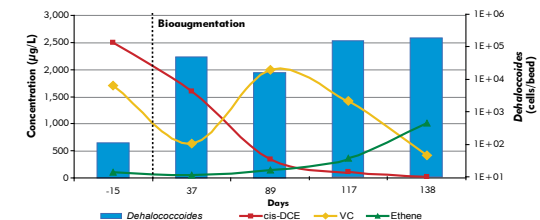
Quantitative PCR is used to detect and quantify targets of interest (i.e. *Dehalococcoides*)

Results



Results are emailed to project contact

Assessment



Results are integrated with other site parameters to evaluate site management decisions