Unprecedented power
Molecular detection of *Megasphaera* & *Pectinatus* within hours at the brewery

**THE CHALLENGE**

Low oxygen environments create new risks

Control of oxygen is integral throughout the brewing process, and today’s sophisticated equipment helps to minimize unwanted exposure. However, an unintended consequence of achieving low oxygen standards is an enhanced environment for survival of *Megasphaera* and *Pectinatus*. These organisms can produce a sulphuric odor, and turbidity or haziness in the finished product. Typically, extensive sanitation processes beyond a standard CIP are required to eradicate these bacteria.

Successful culturing of these strictly anaerobic microbes is challenging; even with careful plating practices, traditional methods can result in false negatives. Results from plating can take a week or longer by which time the organisms can proliferate and potentially cross-contaminate subsequent brews. Most PCR systems require a 2-day enrichment period and are therefore difficult to use as a quality release tool.

**THE OPPORTUNITY**

Accurate detection in under 3 hours

*brewMAP*, powered by Veriflow, is a game-changing molecular platform with unparalleled accuracy and ease of use for rapid detection of *Megasphaera* and *Pectinatus* at the brewery. The Veriflow non-enrichment method utilizes DNA Signature Capturing Technology to amplify and identify microbes, with results within three hours of sample collection. *brewMAP* is the only *Megasphaera* and *Pectinatus* detection tool that allows for actionable response to the threat of these damaging bacteria to prevent bottling or shipping at risk. Rapid detection reduces the risk of cross-contamination, and can mitigate the need for widespread sterilization of vessels and equipment.

**THE SYSTEM**

Simple and cost efficient deployment at your brewery

The system is comprised of a small, customized thermocycler, pre-aliquoted PCR reagent tubes, and proprietary buffers. Results are obtained in less than 3 hours via hand-held disposable cassette. *brewMAP* is ideally suited for both high volume and craft brewers – with a modest capital investment and affordable per-test cost. Sample collection and prep is simple and can be completed by brewery staff with minimal training.

<table>
<thead>
<tr>
<th>Veriflow DNA Signature Capturing Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA Amplification</td>
</tr>
<tr>
<td>DNA Identification</td>
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<tr>
<td>Sample Preparation</td>
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<tr>
<td>Visualization of Results</td>
</tr>
</tbody>
</table>

“Traditional micro methods for plating *Megasphaera* and *Pectinatus* can take days to weeks, which is impractical for both quality assurance purposes and the quality control of our beer. We have implemented *brewMAP* into our routine testing protocol in low alcohol/IBU brands alongside *brewPAL* to ensure our beer is free of these serious beer spoilers before it leaves the brewery.”

— Drew Russey, PhD, Laboratory Manager, Saint Arnold Brewing Company
**PRIMARY BENEFITS OF brewMAP**

- Accurate, sensitive, and specific to microbes that are challenging to detect through traditional testing methods
- Results in less than 3 hours minimizes the risk of wide-spread contamination
- Rapid on-site detection provides peace of mind against costly production down-time, product holds, or the prospect of extensive product recalls

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**Test Protocol**

**DETECTION IS SIMPLE AND FAST**

**COLLECTION**
Collect sample and centrifuge. Resuspend sample using provided proprietary Buffer A.

**START - MINIMAL SAMPLE PREP**
Spin 10 Minutes

**AMPLIFY**
Transfer 5 µl of resuspended sample into provided PCR reagent tube. Place tube into Thermocycler and run program.

**2.5 HOUR AMPLIFICATION**

**ANALYZE**
Remove PCR Tube from Thermocycler and add proprietary Buffer B. Dispense PCR Tube contents onto test cassette window. Wait 3 minutes and retract test cassette switch to reveal test results. One line indicates negative result, two lines indicates semi-quantitative positive results.

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**brewMAP Performance Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Sensitivity (LOD)</th>
<th>Time to Results</th>
<th>Matrix Compatibility</th>
<th>Assay Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megasphaera species:</td>
<td>10 CFU/ml</td>
<td>Less than 3</td>
<td>Beer, environmental, liquid culture</td>
<td>Qualitative and semi-quantitative</td>
</tr>
<tr>
<td>Megasphaera cerevisiae,</td>
<td></td>
<td>hours</td>
<td></td>
<td></td>
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<tr>
<td>Megasphaera paucivorans,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megasphaera sueciensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pectinatus species:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pectinatus frisingensis,</td>
<td></td>
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<tr>
<td>Pectinatus cerevisipillus,</td>
<td></td>
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<tr>
<td>Pectinatus haikarae</td>
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</tr>
</tbody>
</table>

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**ADDITIONAL TOOLS FOR YOUR BREWERY**

Invisible Sentinel’s portfolio of detection tools for breweries utilizes the same simple sampling, workflow, and equipment including the Veriflow Thermocycler. These tests are utilized throughout the brewing process, from post-boil to packaging as part of proactive quality management in the brewery.

**ITEM #**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS1034 brewMAP Complete Test System</td>
<td>1 Kit, 24 Tests</td>
</tr>
<tr>
<td>ISTC002 Veriflow Thermocycler</td>
<td>1 Unit</td>
</tr>
</tbody>
</table>

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For more information or to place an order, please contact Invisible Sentinel at 215.966.6118 or www.invisiblesentinel.com

Invisible Sentinel, a global molecular solutions company, is dedicated to providing first-in-class microbial detection tools. The company’s core technology, Veriflow, is a patented, game-changing platform that integrates molecular diagnostics, antibody design, and immunoassays. Veriflow technology is AOAC International Certified for foodborne pathogen detection, and is used globally by food manufacturers, 3rd party testing labs, and premium wineries along with craft breweries.

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