Effective Online Microbial Monitoring for Onsite Water Reuse

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Presented to NEWEA Annual Conference & Exhibit, Boston Massachusetts

February, 2nd, 2021

NSU – Who We Are?

1 Design/Build

- **130+** Community Onsite Systems Designed & Built by NSU

2 Operations & Maintenance

- **240+** Community Onsite Systems Managed by NSU across North America.

3 Ownership

- **20+** Community Onsite Systems Owned by NSU

Small Community On-site Wastewater Treatment
40 homes; Agriculture/ Open Space Preservation.

Bristol-Meyers Squibb, NJ
1st Pharmaceutical Onsite Water Reuse system in the US.

250,000 GPD on-site water reuse system for New England Patriots, Foxboro, MA

The Solaire, Battery Park, NYC
1st residential water reuse project in the U.S.; LEED-Platinum

MacDonald Island, AB, Canada
Integrated Water Reuse and Heat Recovery system utilizing treated wastewater effluent for irrigation and flush water while also recovering the effluent heat for pool heating within the rec center.

1980s

1990s

2000s

2010s

Copper Hill Elementary School, East Amwell, NJ
1st public school water reuse system

Sonoma Raceway, CA
NSU Operates both the Onsite water supply and wastewater treatment facilities for the raceway.

Sub-surface Treatment Wetland Systems,
Operates the most natural treatment systems in the U.S.

The New School University, NYC
40,000 GPD in-building onsite water treatment & reuse for flushwater, cooling, irrigation & laundry.

Durst Halletts Point, Queens NYC
District scale redevelopment with in-building water reuse and thermal energy recovery systems

- NSU Provides Onsite Wastewater Treatment Solutions

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LUMINULTRA microbial monitoring

NSU Onsite Water Reuse in NYC

1999

Battery Park City

1st in-building water reuse system for residential high-rise in the US (Solaire). Battery Park City contains six (6) in-building water reuse systems serving eight (8) buildings

New School

40,000 GPD water treatment & reuse for flushwater, cooling, irrigation & **laundry** at New School University

Via / Helena

The Helena in-building water reuse system was upgraded/**retrofitted** with capacity increased to 60,000 GPD to serve the adjacent VIA building.

Halletts Point

District scale redevelopment with in-building **water reuse** systems at Durst Halletts Point

QPP-Sven

Queens Plaza Park (Sven) is projected to be the tallest building in Queens and will contain the largest in-building water reuse at **100,000 GPD**

2021 & Beyond

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LUMINULTRA® microbial monitoring

Safety and Public Health of Water Reuse

- Disadvantages of culture-based tests (Total coliform, fecal coliform, E. coli, and HPC)
  - Underestimate the total microbiological population
  - Long incubation time = long turnaround time
  - Long response time to the system abnormal activities
  - Labor intensive and cost prohibitive

- Monitoring water quality is supposed to be
  - Continuous
  - Fast
  - Reliable
  - Inexpensive

BugCount® Online ATP Analyzer

- The analyzer measures total Adenosine Triphosphate (ATP), to determine the total microbial content in a specimen.
  - ATP is the primary energy carrier for all life forms and can be found only in and around living cells.
  - ATP is quantified by measuring the light produced through its reaction with the naturally-occurring firefly enzyme Luciferase using a Luminometer.
  - The amount of light produced is directly proportional to the amount of ATP present in the sample.

- Developed by LuminUltra Technologies
  - Headquartered in Atlantic Canada, LuminUltra has 25 years of experience delivering microbial monitoring measurement tools to customers in over 80 countries

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LUMINULTRA® microbial monitoring

Advantages

- Fast Measurement
  - Results are available in less than 8 minutes, so any impending threats are detected immediately.

- Complete Measurement
  - Because ATP is present in all living cells, the total 'threat' in the sample can be assessed.

- Less Labor Requirement
  - Sampling, measurement, and reporting are done automatically, freeing up time for other tasks.

Installation and Operation

- Step 1
  - Easy installation (2~3 hours)
- Step 2
  - Insert the specific reagent cartridge
- Step 3
  - Connect to the sample source.
- Step 4
  - Dial in your testing frequency and begin testing in the online platform. Standardized frequency lets you get ahead of system problems, saving time and money by avoiding downtime and product waste.

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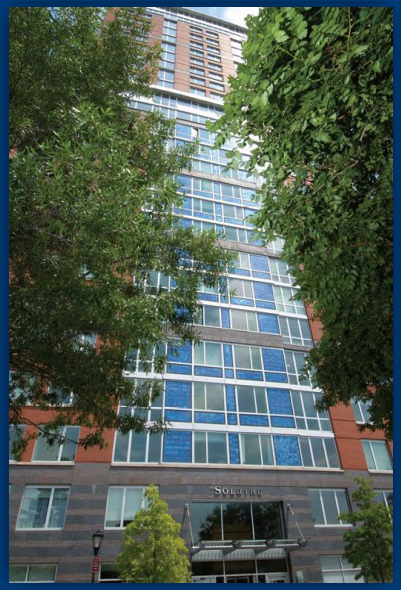
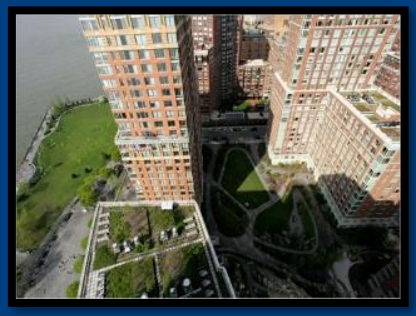
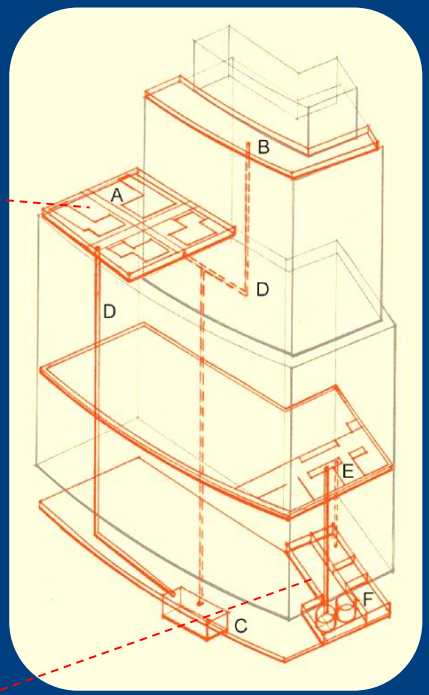
Demonstration Site – Solaire NYC





Application Areas

A. Landscape Roof Garden
B. Planted Roof
C. Storm Water Storage Tank for Site Irrigation
D. Irrigation of Planted Roof with Recycled Storm Water (drip irrigation)
E. Low Flow Plumbing Fixtures
F. Water Recycling Plant

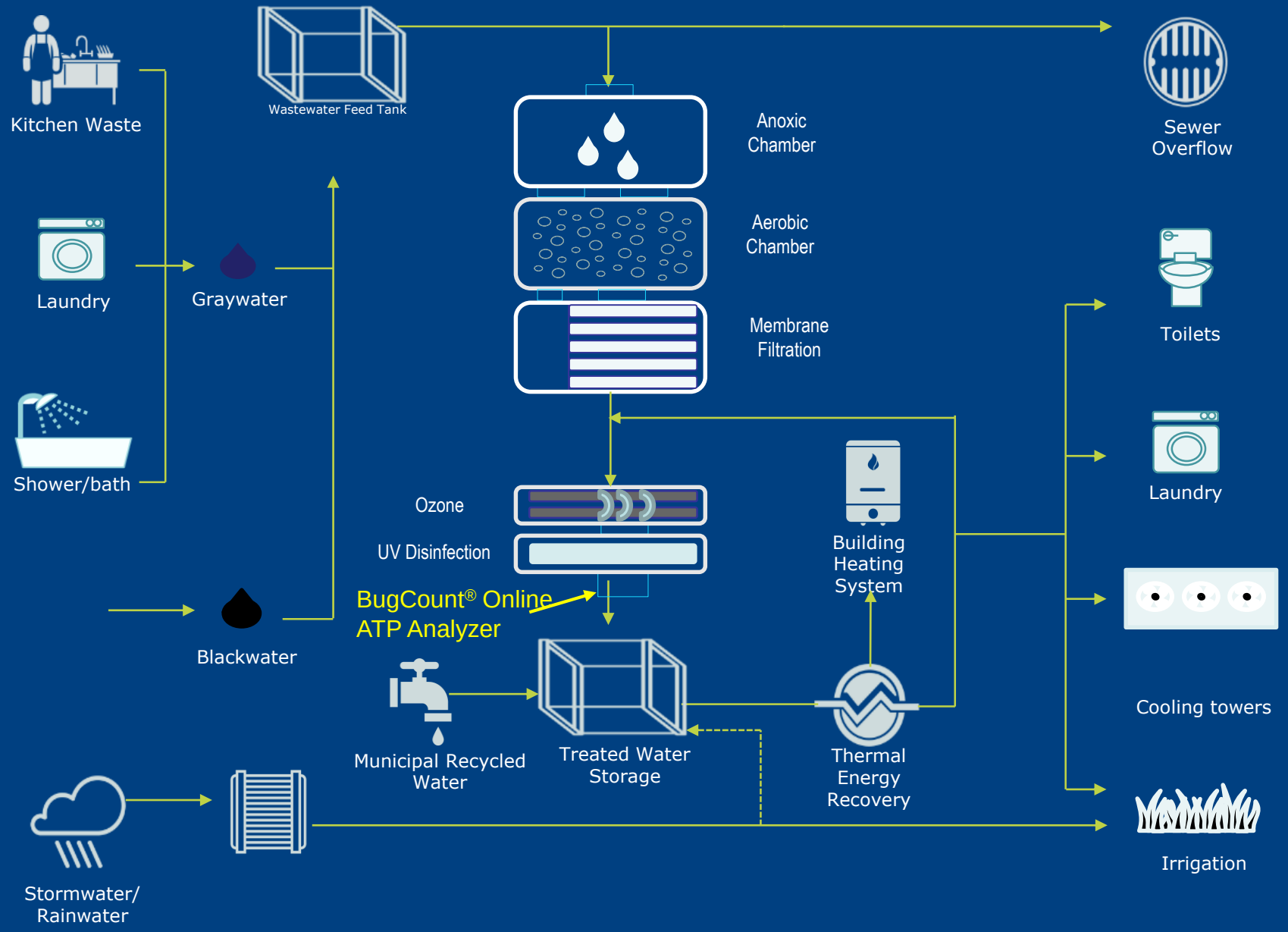


Reuse Applications

- Toilet Flushing
- Cooling Tower Make-Up Water
- Laundry
- Landscape Irrigation

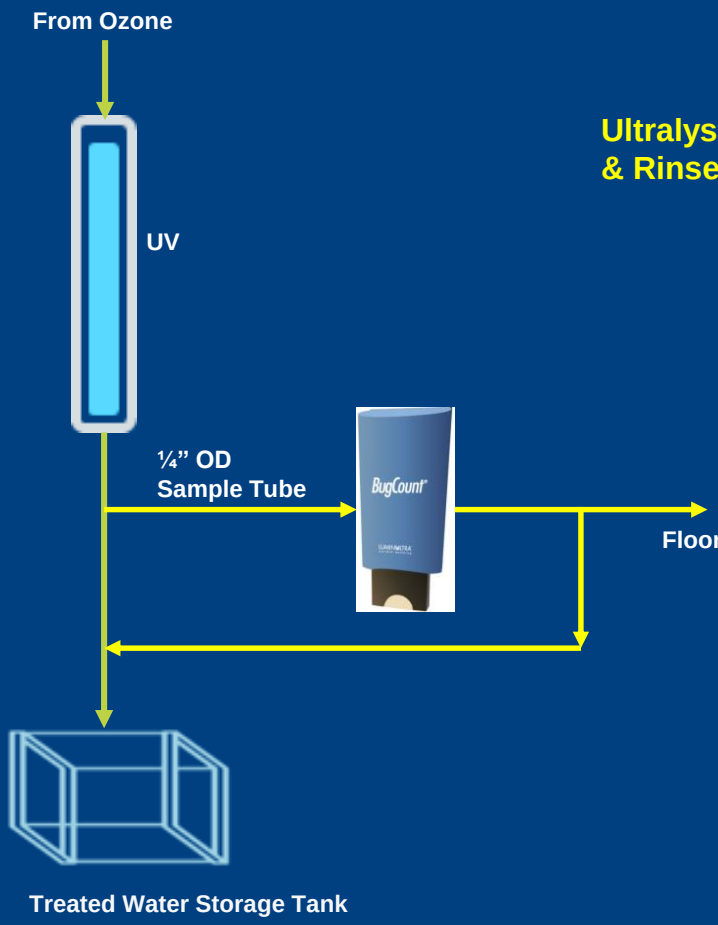
- **Objectives**
  - Provide automatic sampling, measuring and reporting of microbial analysis, hence reducing the labor burden
  - Provide early and immediate detection of ultrafiltration membrane fails
  - Implement of rapid preventive or corrective actions

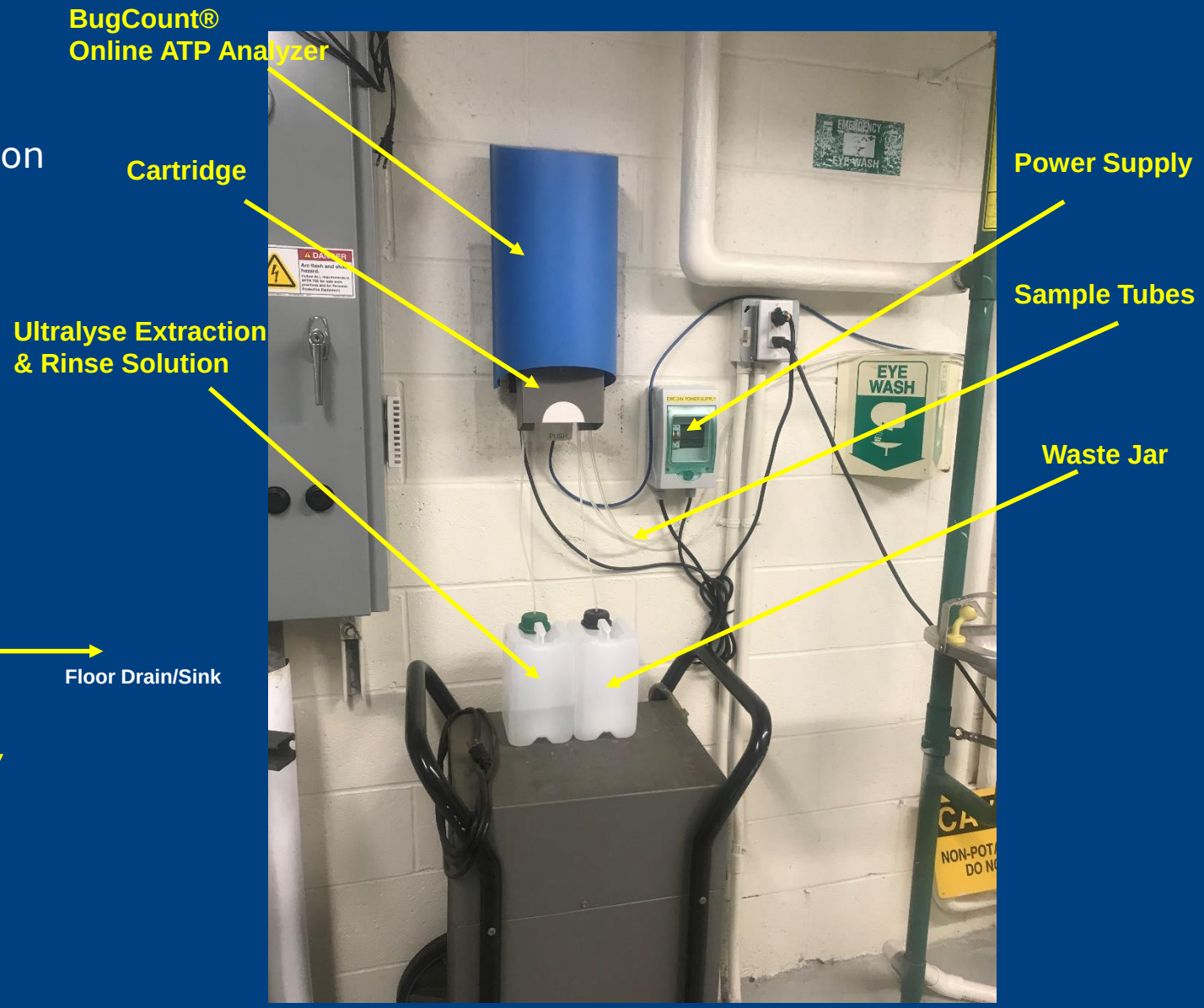
Water Reuse System at Solaire



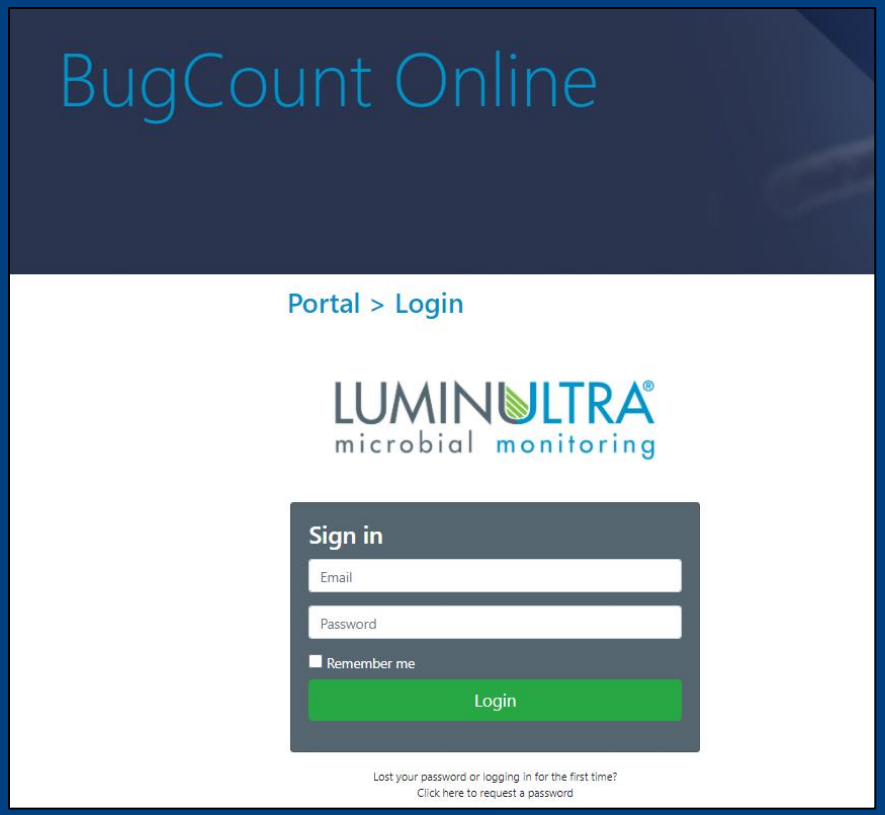
Field Installation

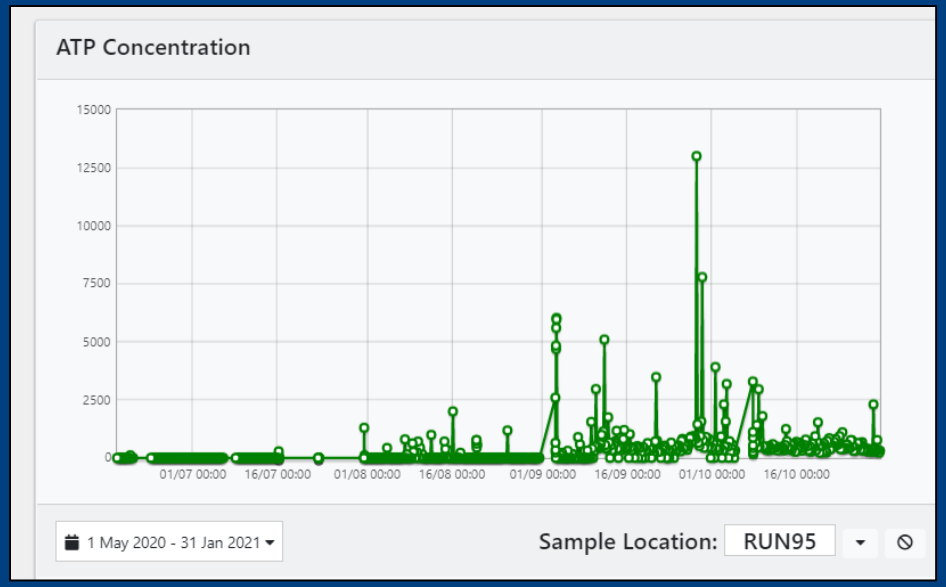
- Flow Through Configuration

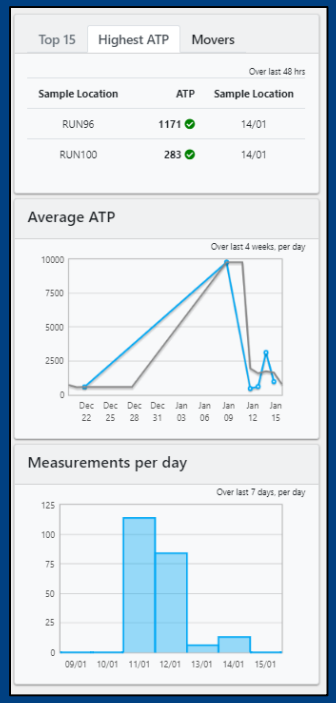


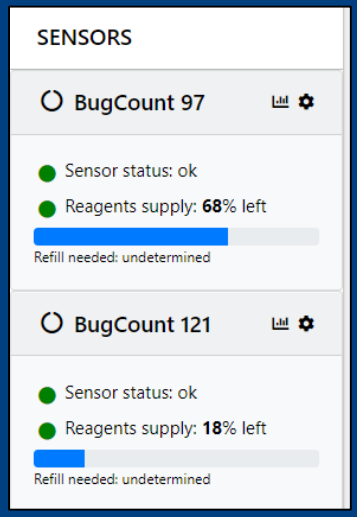


Online Data Collection Portal









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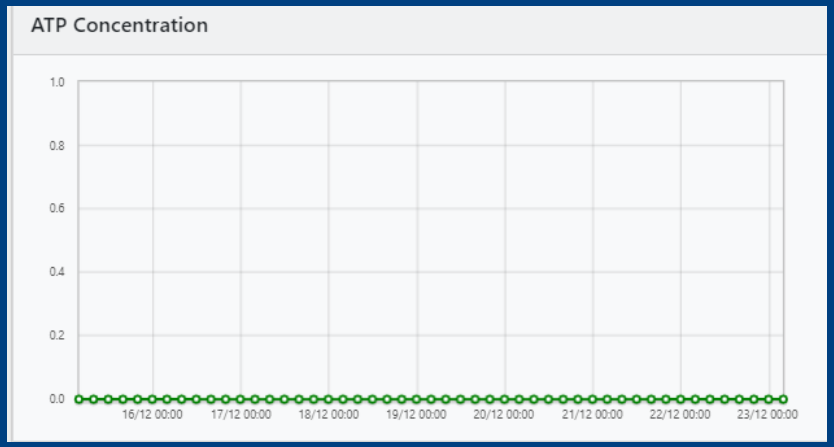
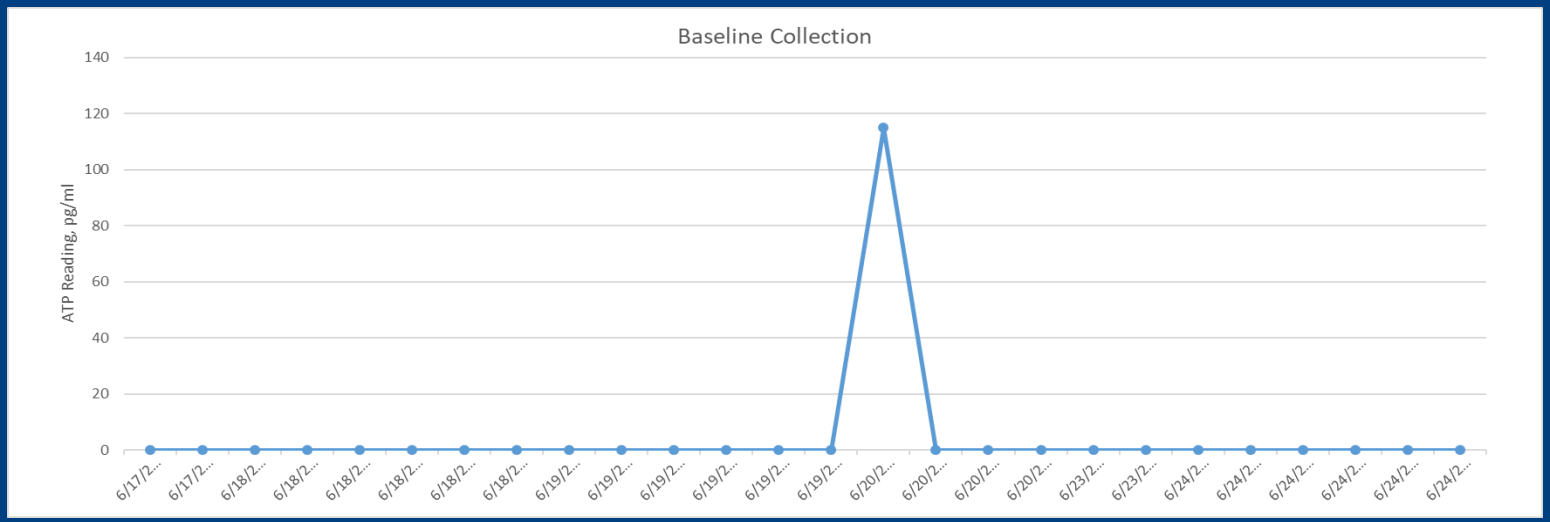
Baseline Collection

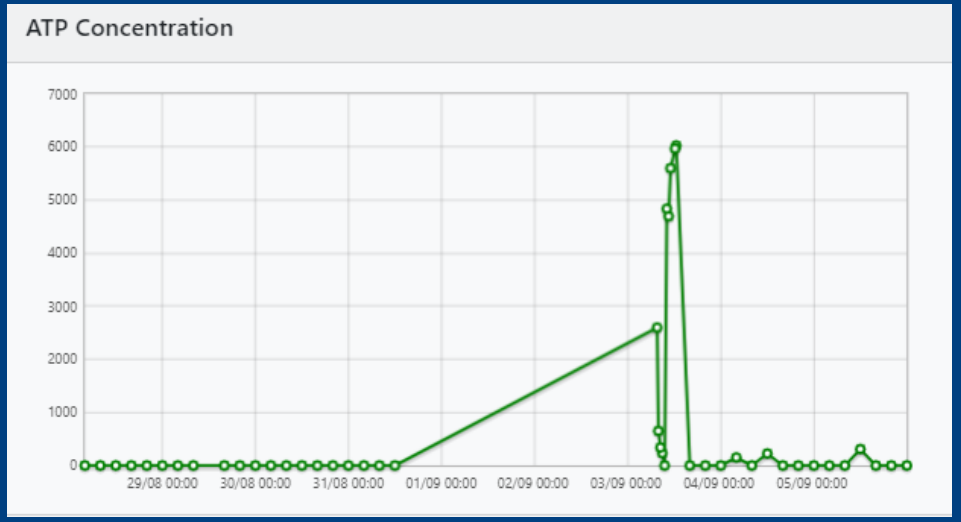
- Establish analyzer baseline signal under the normal operational conditions
- Flag the unexpected detection

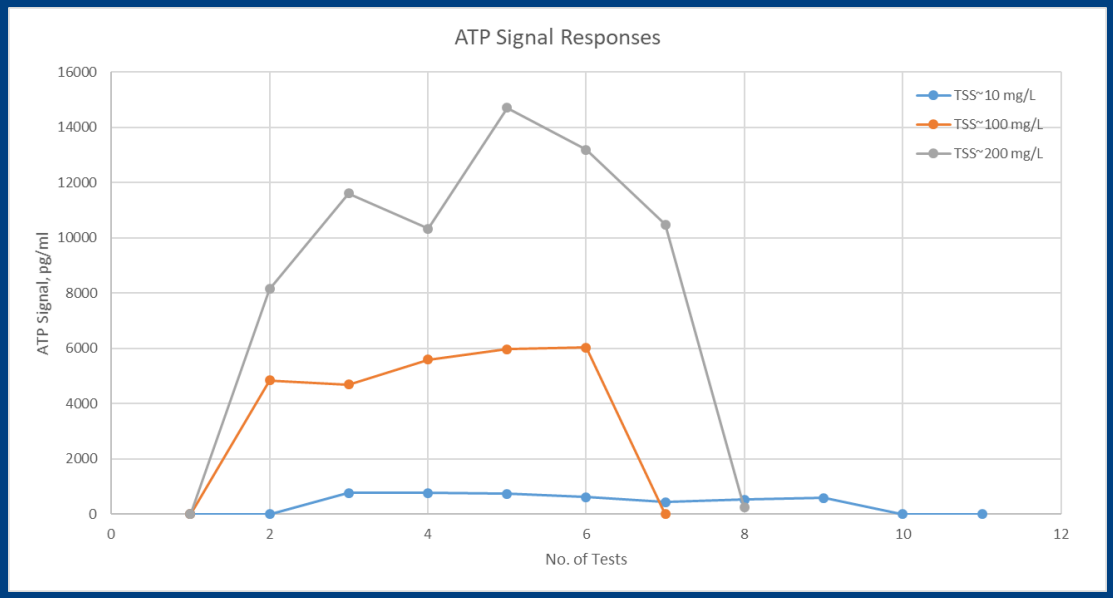


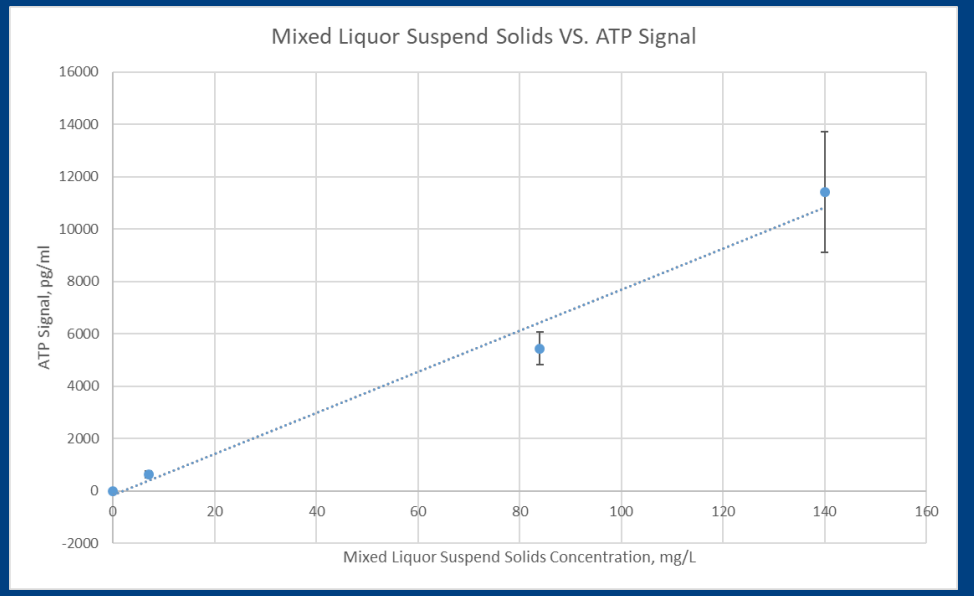


Challenge Tests

- Manually introduce the disturbance to simulate the membrane fails, and record the responses
- Effectively captures the “disturbance”
- Customized alarm through the data portal



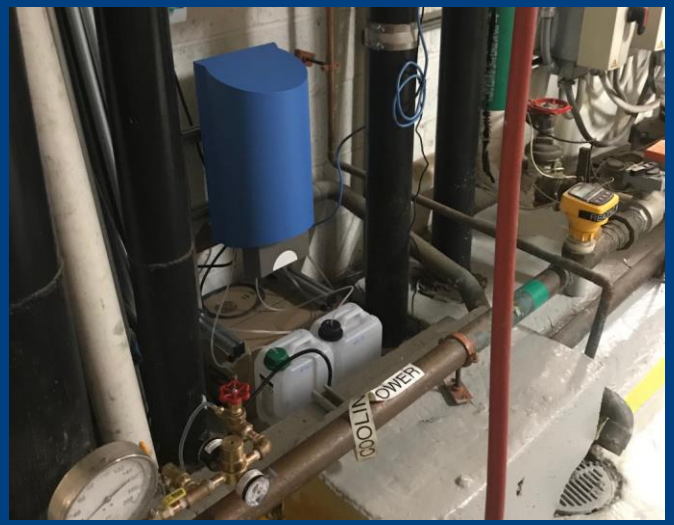




Other Potential Benefits

- On-going study: The results can be used an indicator of the bacteria regrowth in process piping and treated water storage tank.

- Monitor reuse water quality supplied at the point of the cooling tower
  - Indicating the bacteria growth in building non-potable water distribution system
  - Support the informed decision on distribution system cleaning.



Summary

- BugCount® online ATP analyzer provides automatic sampling, measurement, and reporting of microbial tests.

- Multiple benefits that the analyzer brings to the onsite non-potable water reuse system.
  - Provide rapid and frequent microbial tests to monitor water quality
  - Provide immediate detection of membrane fails
  - Indicate the bacteria regrowth within the treatment and distribution system.
  - Free up the operator's time for other tasks

Acknowledgements

- LuminUltra Technologies Ltd.
  - Brad McIlwain, Diana Xu
- Solaire Staff and Management Team
  - Miroslav Salon, Arthur Korzyk
- Natural Systems Utilities
  - Rick Petrosino, Bruce Douglas, Robert Gillow, Dante Lombardo

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Questions?

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