Positive Control Verification Testing using the Sievers Soleil Rapid Bioburden Analyzer

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Introduction

What if you obtain bioburden results in less than 45 minutes?

The recent publication of Annex 1 has sparked increased interest among pharmaceutical companies in implementing Rapid Microbial Methods (RMMs). When selecting an RMM as a Process Analytical Tool, it is crucial to ensure correlation with traditional methods. Global pharmacopeias recommend comparing results from alternative methods to compendial methods, typically using common microorganisms. The Japanese Pharmacopeia specifically suggests using microorganisms in a starved state to simulate real-world contamination events.

In response to these guidelines and industry needs, a comprehensive comparison study was conducted between the Sievers Soleil Rapid Bioburden Analyzer and traditional bioburden test plating methods. This extensive study involved:

- 11 individual microorganisms and a mixed culture
- Two laboratory sites
- Six analysts
- Six instruments

Our evaluation adhered to USP <1223> criteria, assessing:

1. Range
2. Linearity
3. Robustness
4. Precision
5. Reproducibility
6. Ruggedness

This poster presents the methodology, results, and conclusions of our correlation study, demonstrating the efficacy and reliability of the Sievers Soleil Rapid Bioburden Analyzer as an alternative to traditional plating methods in pharmaceutical microbial testing.

Methods

As part of the daily start up, Negative Controls and System Suitability Standards were run and had to pass the acceptance criteria before testing could begin.

Working stock solutions were created for the following organisms:

- *A. brasiliensis*
- *B. cepacia*
- *B. diminuta*
- *B. subtilis*
- *C. albicans*
- *E. coli*
- *P. aeruginosa*
- *R. pickettii*
- *S. aureus*
- *S. enterica*
- *S. maltophilia*
- *Mixture: B. diminuta, R. pickettii, S. maltophilia, & B. cepacia*

Sample Preparation:

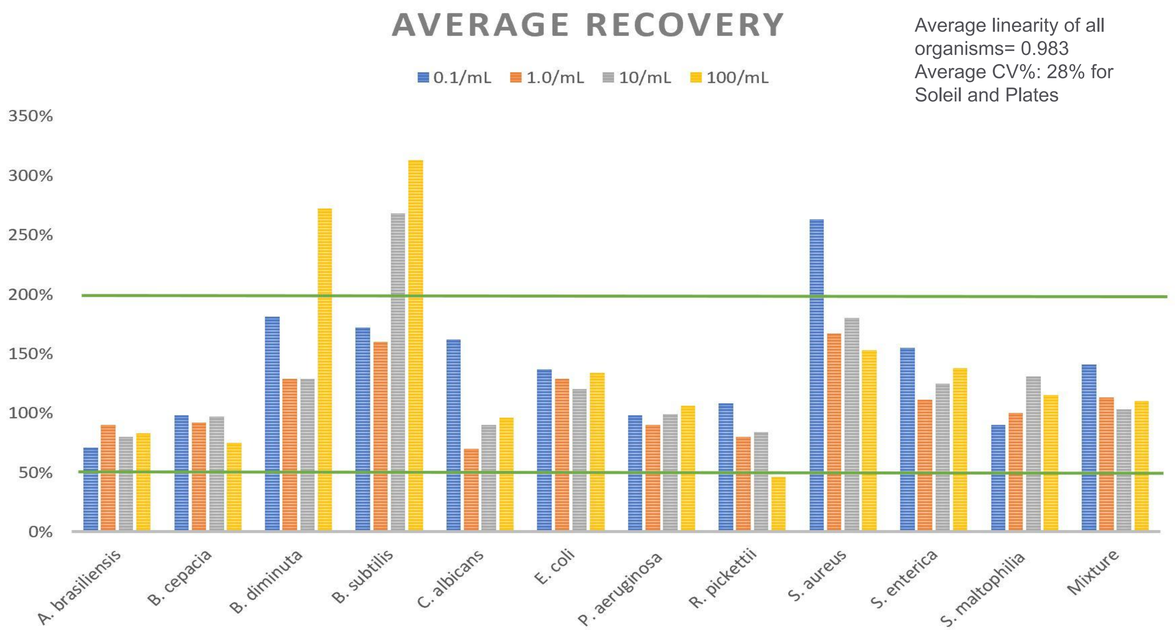
- Concentrations targeted: 0.05, 0.1, 1, 10, and 100 CFU/mL
- Sample volumes were made in 250mL bottles then aliquoted into 100mL samples- one run on Soleil, one for plating
- Serial dilutions performed to achieve desired concentrations
- Solutions added to buffered Water For Cell Culture (WFCC) to maintain cell integrity

Traditional Plating Method:

1. Agar plates prepared using:
   - Tryptic Soy Agar (TSA) for bacteria
   - Sabouraud Dextrose Agar (SDA) for fungi (As directed in USP <61> and USP <62>)
2. Sample filtration:
   - Each solution filtered through a manifold onto a sterile filter
   - Filter aseptically transferred to the appropriate agar plate
3. Incubation:
   - Plates incubated in a cell incubator
   - Minimum incubation period: 3 days

Note: For the 100 CFU/mL samples, flood plates were used.

Results



Average linearity of all organisms= 0.983
Average CV%: 28% for Soleil and Plates

Conclusion

The comprehensive correlation study between the Sievers Soleil Rapid Bioburden Analyzer and traditional plating methods met the criteria outlined in USP <1223>.

1. Detection and Quantitation: Successfully detected and quantified: Gram-positive, Gram-negative, Yeasts, and Mold
2. Performance metrics: Demonstrated acceptable: Accuracy, Linearity, Precision, Range, Robustness, and Ruggedness
3. Sensitivity: Limit of Detection (LoD): 0.05 CFU/mL; Limit of Quantitation (LoQ): ≤1.0 CFU/mL

In conclusion, the Sievers Soleil demonstrated correlation to traditional plate counts in CFU/mL. The above criteria demonstrates that the Soleil is a reliable, efficient, sensitive alternative to compendial plating methods.

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To learn more

See the Sievers Soleil Rapid Bioburden Analyzer in Booth 406

Download our white paper: Soleil RMM Verification Testing for USP <1223>

Visit the Sievers Soleil web page