

Acceptability of Rapid Microbiological Measurement Methods for use in Southern California

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John F. Griffith

BACKGROUND

- Growth-based methods are too slow to protect swimmers from exposure to microbial pathogens
- EPA has approved a qPCR method *Enterococcus* for beach monitoring
- Requirement to demonstrate equivalency with EPA-approved culture-based method at individual beaches to gain approval

TOOK A REGIONAL APPROACH TO DETERMINE HOW MANY OF OUR BEACHES MIGHT QUALIFY

- **Selected 36 worst beaches in Los Angeles, Orange and San Diego counties based on historical data**
- **Trained local water quality monitoring laboratories to conduct qPCR analysis**
- **Collected and analyzed samples for *Enterococcus* using both culture and qPCR**
 - Summer and winter dry weather
 - Targeted 50 samples per site/season
- **Compared results using new EPA equivalency criteria**
 - Simple regression
 - Index of Agreement

RESULTS

- Paired culture and qPCR data were produced from almost 3900 samples
- Only 10 sites in summer and 9 sites in winter had a sufficient range of data to qualify for assessment using EPA criteria
 - Required minimum of 30 samples with numerical result
- Only one site in summer, and three sites in winter would have been approved for monitoring by qPCR based on EPA method equivalency criteria

WHY THE LACK OF AGREEMENT?

- Is it a laboratory performance problem?
- Is it PCR inhibition problem?
- Is it a sample size problem?

LABORATORY PROBLEM?

No.

SCCWRP re-ran all the samples from frozen archives and got a similar result.

PROBLEM WITH PCR INHIBITION?

No.

Excluding samples where PCR inhibition was detected did not improve relationship between methods.

SAMPLE SIZE PROBLEM?

No.

We collected at least 50 samples at most beaches.

OUR BEACHES MAY BE TOO CLEAN!

- **All your efforts to control FIB at beaches have paid off**
- **There was a preponderance of non-detect and low numerical results by both methods**
 - Made it difficult to meet EPA requirement for 30 paired samples with measurable *Enterococcus* by both methods
 - Limited numerical range made correlative agreement difficult to achieve

CURRENT STATUS

- **We think the methods work, but just can't meet the EPA criteria**
 - Possible that qPCR and culture just perform differently at our beaches than where EPA tested the method
- **The State Board has been silent on use of these methods in draft revisions to the Ocean Plan**

NEXT STEPS

- **Shared our results with EPA in a special session at a national conference in May**
 - They agreed that the criteria as written may not be a good fit for California beaches
 - Conversation is continuing
- **There are other options to demonstrate method equivalency**
 - Laboratory studies
 - Method agreement on beach posting decisions
- **We need to develop a direction for approval of rapid microbial measurement methods in California**