2013 qPCR Performance and Demonstration Project
Virginia Beach, VA

VDH Beach Monitoring and Notification Program

Beach Water Monitoring at Virginia's Coastal Beaches

Virginia's coastal beach waters are routinely monitored for enterococci bacteria, which serve as an indicator of fecal contamination in salt and brackish waters. Swimming advisories and beach closures are issued when sample results exceed Virginia's Water Quality Standard (104 cfu/100ml) to prevent exposure to contaminated water and reduce health risks. Virginia's Beach Monitoring Program currently uses culture-based laboratory methods to determine levels of enterococci at Virginia's coastal beaches. This method provides results approximately 24 hours after analysis begins. Using culture-based methods, advisories are not issued until the day after the sample is collected; advisories are not lifted until the day after sample collection occurs.

qPCR Method and Performance Evaluation

Quantitative polymerase chain reaction (qPCR) is a molecular method that quantifies bacterial DNA and can be used for the analysis of enterococci bacteria in saltwater. Results from qPCR are available approximately four hours after sample analysis begins. Compared to culture-based methods, qPCR may provide increased public health protection by providing notification to water users on the same day samples are collected.

The U.S. Environmental Protection Agency (USEPA) recently released the 2012 Recreational Water Quality Criteria and EPA Method 1611 for enterococci qPCR. These documents provide information and recommendations for states that are interested in adopting state water quality standards for enterococci using qPCR methods. Due to limited experience of the use of qPCR methods in saltwater, EPA encourages states to evaluate enterococci qPCR methods in prospective waters prior to the development of new standards based on qPCR methods.

Project Objective

The objective of this project is to evaluate the performance of enterococci qPCR methods from beach water samples at select sites in Virginia Beach, VA. The project will evaluate the performance of EPA Method 1611 including accuracy, precision, and sample interference/inhibition. The project will also determine if sample collection, analysis, issuance of beach closures, and re-opening beaches based on qPCR method results are logically feasible. Outcomes from this project will be shared with local, state, and federal beach monitoring stakeholders to help determine if this method is suitable for permanent use in Virginia.

Project Design

Water samples will be collected weekly from five sites in Virginia Beach throughout the swimming season. Samples from these five sites will be analyzed using both the culture-based method and the qPCR method. QPCR method results will be compared to EPA's recommended Statistical Threshold Value (STV) for qPCR enterococci and culture-based sample results to determine if similar public health decisions would occur using both methods. This comparison will demonstrate whether beach closures/re-openings would vary by method used. While qPCR is still being evaluated for use in Virginia, beach closures will not be issued or re-opened using qPCR results.