

COMPLETION NOTICE
CD ¶5 (b) an epidemiological study in a tropical region.

Summary of the Studies

EPA conducted an epidemiological study in marine waters in a tropical region to determine the relationship between rapid test methods for detecting fecal indicator organisms in recreational water quality to develop associations between levels of these fecal indicator organisms and illnesses among swimmers. The fecal indicator bacteria, *Enterococcus*, were also measured by a standard culture method (EPA Method 1600).

The study design was the same as the design used at the freshwater (Great Lakes) and marine beach sites. In brief, on summer weekends and holidays in 2009, beachgoers were offered enrollment in the study. Those who agreed completed three interviews: an enrollment interview, an interview upon leaving the beach and a telephone interview 10-12 days later. The second interview determined exposure to water and other activities during the beach visit. The telephone interview ascertained the occurrence of health symptoms experienced since the beach visit. Eighteen water samples were collected and tested each day for indicators of fecal contamination: *Enterococcus* spp. and *Bacteroidales* spp. using quantitative polymerase chain reaction, and *Enterococcus* using the standard culture based method. Swimmers were identified as those who immersed, at a minimum, their body in the water. Health endpoints studied include: gastrointestinal (GI) illness, upper respiratory illness, rash, earache, and eye irritations.

EPA conducted quality assurance/quality control procedures on all field data collected. EPA performed statistical analyses to evaluate the association between water quality and health endpoints.

Summary of Findings Boquerón Beach

A total of 15,726 individuals were enrolled. Swimmers reported higher rates of rash compared to non-swimmers but swimmers experienced the same rates of GI illness, respiratory illness, earache, and eye irritations as non-swimmers. Densities of fecal indicator bacteria were low and no single day exceeded the currently recommended EPA criteria for *Enterococcus* as measured by the standard culture method. In addition, many qPCR assays could not be completed because of interfering or inhibitory substances in the water sample. These two factors (good water quality and interference of the qPCR assay) complicated interpretation of the relationship between health and water quality. As a result of the good water quality and the interference of the qPCR signal, consistent health relationships could not be developed between fecal indicator organisms measured by qPCR and swimming-associated illness.

Further information is available in the EPA Report EPA/600/R-10/168: *“Report on the 2009 National Epidemiologic and Environmental Assessment of Recreational Water Epidemiology Studies (NEEAR): Boquerón Beach, Puerto Rico, and Surfside Beach, SC of the paper published in Environmental Health”*

This study has been completed as of December 15, 2010.