NATURAL RESOURCES DEFENSE COUNCIL
Testing the Waters 2004

Pathogenic Agent Disease
Rotavirus Gastroenteritis
Protozoa:
Balantidium coli Dysentery, intestinal ulcers
Cryptosporidium Gastroenteritis
Entamoeba histolytica Amoebic dysentery, infections of other organs
Giardia lambia Diarrhea (intestinal parasite)
Isospora belli and *Isospora hominis* Intestinal parasites, gastrointestinal infection
Toxoplasma gondii Toxoplasmosis

Adequacy of Water Quality Standards

In the Clean Water Act, Congress directed the EPA to develop guidance on the maximum level of pollution acceptable for various uses of water. For swimming in ocean and bay water, the EPA recommends a geometric mean standard (a measure based on a number of samples taken within a given time frame) of 35 enterococcus bacteria per 100 milliliters (ml) of water and an instantaneous (single sample) standard of 104 enterococcus bacteria per 100 ml of water.[16] Although such levels are deemed acceptable, they are not completely safe: the EPA estimates that 19 out of 1,000 people swimming in water just meeting this standard will become ill. The EPA-recommended standard for Great Lakes (fresh) water is a geometric mean of 33 enterococcus bacteria per 100 ml of water or 126 *E. coli* bacteria per 100 ml. Water just meeting this standard will cause an estimated eight illnesses per 1,000 swimmers. For example, if a family of four swam once a week in June, July, and August in ocean waters that just met EPA's standard, one member of the family would probably become ill. Likewise, if 3,000 people swam one day in the same waters, statistically 57 illnesses would be expected.

While standards for levels of bacterial indicators are important, they may not be enough to protect swimmer safety. A recent study concludes that "a majority of pathogens responsible for outbreaks of human illnesses acquired from marine recreational exposure have not been identified but are thought to be viruses."[17] This study also noted a trend in research findings that bacterial indicator occurrence frequently did not correlate with viral occurrence.[18] A study conducted by the Department of Environmental Analysis and Design, University of California, Irvine, found human adenoviruses in 4 out of 12 samples taken at the mouths of major rivers and creeks on beaches from Malibu to the border of Mexico in February and March 1999. Researchers also tested for the bacterial indicators used for beachwater monitoring in the state (total coliforms, fecal coliforms, and enterococcus) but found no correlation with the presence of these viruses. The study recommends that current recreational water quality standards be improved to reflect the presence of viruses and that regular monitoring for human viruses be conducted on a regular basis.[19] A report compiled for Heal the Ocean notes that "because the minimal infection dose of viruses is assumed to be very low, disinfected effluent free of indicator bacteria provides a false sense of safety because the effluent can still contain infectious virus at comparatively high levels."[20] The report further suggests more advanced, tertiary treatment as a "laudable goal" for ocean sewage treatment plant discharges.