Environmental Planning Office
Department of Health
645 Halekauwila Street
Honolulu, Hawaii 96813

Dear Sir/Madam:

Department of Health, Administrative Rules
Title 11, Chapter 54
Water Quality Standards
State of Hawaii

The above referenced document is an amended version of the Water Quality Standards for the State of Hawaii. This revision includes elements of the State Toxic Control Program, on which we previously commented on December 7, 1988.

The review of this document was conducted with the assistance of Hans-Jurgen Krock, Ocean Engineering; Edward Laws, Oceanography and Marine Sciences; and C. Anna Ulaszewski of the Environmental Center. In addition to the above cited contributors, we have been aided in our review by the testimony of Roger Fujioka of the School of Public Health and Water Resources Research Center, as presented at the August 29, 1989 public hearing.

We concur with the concerns expressed by Dr. Fujioka with regard to the use of enterococci bacteria as indicators of human fecal contamination. It is our understanding that enterococci occur naturally in Hawaii's environment from sources quite removed from human fecal waste. Hence, the assumption that the presence of enterococci in the coastal waters should be attributed to human sewage contamination may be incorrect. We believe that the United States EPA should reevaluate its present standards and criteria as they are applied to tropical environments and, if necessary, develop specific standards and criteria for use in tropical environments.

We also recommend that 11-54-08(1), which establishes criteria for inland recreational water be amended. We believe that it is important not only to determine the presence of fecal contamination, but to determine the
source. Runoff from feed lots, piggeries and other animal husbandry activities do contain pathogens. We recommend that samples also be tested for Streptococci. The ratio between Streptococci and E. coli could then be used to determine possible origin. However, this procedure is not appropriate for marine waters because the more rapid die-off rate of E. coli in the marine environment could compromise the results.

Thank you for the opportunity to comment on this document.

Yours truly,

Jacquelin Miller
Associate Environmental Coordinator

Enclosure

cc: OEQC
   L. Stephen Lau
   Edward Laws
   Hans-Jurgen Krock
   Roger Fujioka
   C. Anna Ulaszewski
Testimony of Roger Fujioka  
Water Resources Research Center, Univ. of Hawaii

Public Hearing: August 29, 1989
Revision to Chapter 54, Water Quality Standards
Subsection 11-54-08: Marine Recreational Water

My name is Roger Fujioka. I have been conducting research on the microbiological quality of water in Hawaii as a researcher at Water Resources Research Center, University of Hawaii since 1972. More recently, I have been appointed as graduate faculty of the Department of Microbiology and Professor of Public Health Sciences at the University of Hawaii. I am also an active member of the Water Quality Standards Advisory Committee and the Ad Hoc Committee on Staphylococcus & Hanauma Bay. As a member of these two committees on water quality and as an independent researcher for WRRC, I have shared my research data and conclusions at appropriate public forums. I consider this public hearing to be an appropriate public forum.

My testimony today relates specifically to the revision of subsection 11-54-08 which proposes to lower the enterococci bacterial concentration to a geometric mean of seven per hundred ml with the expressed intent of protecting the recreational swimmers from bacterial contamination of human fecal origin. My testimony does not object to the revision resulting in making the marine recreational water quality standards more stringent. My testimony addresses a more basic question which is to question the applicability of using the USEP new criteria and standards to assess the quality of recreational waters in Hawaii. By new criteria I mean the use of enterococci bacteria as indicator of human fecal contamination of waters. By standards I mean the concentrations of enterococci bacteria in recreational waters which can be related to disease risk based on data obtained at three sites on the mainland by USEPA.

Having said this I wish to review some important historical events, some of my data and my assessment to support my position.

1. From the early 1900 to the present, the criteria for determining the quality of recreational waters was coliform bacteria. This was an unsatisfactory criteria or indicator of water quality because the concentrations of coliform bacteria in water could not be related to risk of human infections using that body of water.

2. From 1972-1982, USEPA conducted the first bona fide epidemiological and water quality study which resulted in establishing concentrations of enterococci in marine recreational waters with incidences of gastrointestinal diseases among swimmers using those waters. The value of this study was that it demonstrated that coliform bacteria concentrations in water could not be used to predict risks to swimmers but that concentrations of enterococci bacteria could be used to predict risks of gastrointestinal diseases among swimmers. A severe limitation of
this study was that the data was obtained only from three sites, New York City, NY, Boston Harbor, MA, and Lake Pontchartrain, LA. and yet the data base was to be applied equally to all the fifty states and US possessions.

3. In 1984, based strictly on acceptable risk table developed from the EPA study, USEPA proposed that the marine recreational water quality standards be limited to 3 enterococci /100 ml which corresponded to a predicted rate of 6 gastroenteritis /1000 swimmers. I and many others testified against setting the standards so low because our laboratory methods were not dependable at these low levels and the end result may be the closing of many of our beaches in Hawaii.

4. In 1986, after receiving all the public comments for its 1984 proposal, USEPA revised their proposed new water quality standards to 35 enterococci /100 ml which is what each state, including Hawaii is currently implementing. In my opinion, this EPA decision has caused confusion and placed the responsibility of really maintaining water quality back to the states. This decision has caused considerable confusion because in revising the standard from 3 enterococci to 35 enterococci /100 ml, EPA has abandoned the use of the risk table that was developed and published by EPA. The number of 35 enterococci /100 ml was chosen because states had historically accepted a risk associated with that of 200 fecal coliform /100 ml and the number 35 enterococci /100 ml was the number associated with 200 fecal coliform /100 ml. However, based on the EPA risk table, 35 enterococci /100 ml corresponds to a disease rate of 19 gastroenteritis /1000 swimmers which is too high a rate of acceptance from an epidemiological point of view. Thus, it is my conclusion that EPA has created a problem for water quality regulators for each of the states.

5. Presently, (1989) the crucial questions facing Hawaii are whether we accept as applicable to Hawaii, the EPA water quality criteria, water quality standards and disease risk table. My own research results show that many of the indicator bacteria such as enterococci, fecal coliform, and Escherichia coli, are naturally present in our environment (soil, plants, streams) and these sources of indicator bacteria are not related to direct human fecal contamination. Since there are many environmental sources of enterococci and other indicator bacteria in Hawaii’s environment, the detection of these bacteria in the environmental waters of Hawaii does not necessarily mean that the water has been contaminated with human fecal wastes. Thus, the criteria or use of enterococci bacteria to assess water quality is of questionable value in Hawaii. If marine recreational waters contain high levels of enterococci bacteria but the source of this bacteria is environmental and not from human fecal wastes, the disease risk associated with swimming in these waters would be considerably less. Thus, the disease table as determined by EPA would not be directly applicable and the basis of setting water quality standards would be of questionable value.
6. My recommendation is that Hawaii petition USEPA to reevaluate whether the federal water quality criteria and standards are directly applicable to Hawaii. On a broader scale, Hawaii is accepted as being a tropical island and environmentally very different from the temperate, continental USA. This difference should also be recognized on a microbiological level.

Hawaii as well as other tropical islands must recognize that principles of water quality and the data base for the monitoring of water quality have all been obtained from temperate countries primarily from North America and Europe. These water quality principles and data are published in textbooks which do not recognize that tropical islands are different. As a result, by reading textbooks, which is how most of us are taught, we will all draw the same conclusion: that published water quality data are directly applicable to Hawaii. The end result is that people in tropical islands will continue to be forced to operate under assumptions which are often not applicable to their own conditions. One obvious consequence is that due to the high concentrations of enterococci recovered from our stream waters and some marine recreational waters, these sites will be perceived to be highly contaminated with human fecal matter, although this may not be the case. Far reaching decisions may be made based on this conclusion.

In summary, problems in Hawaii cannot be solved when wrong assumptions are made. We in Hawaii must first agree that the tropical, island conditions of Hawaii are different from that of the temperate, continental USA and we must obtain data from Hawaii to truly assess the problems in Hawaii. Having accomplished this, we must be prepared to persevere in our resolve to convince EPA to help Hawaii establish water quality standards appropriate for Hawaii.