Implementing Bacteria Objectives: A Reference System Approach

Water Quality Standards Academy
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Protecting REC-1 Use in CA

- Beaches among most heavily used in world …
- … But also adjacent to heavily urbanized areas
- Resulting in significant risk to public health from poor water quality
- High priority to implement aggressive programs to protect & improve beach water quality

Basis of REC-1 Water Quality Objectives in CA

- EPA epidemiological studies on health risks of swimming in water with elevated bacteria

AND

- Local epidemiological study showing links between bacterial indicator density in single samples & health risks
  - Health effects observed include:
    - vomiting, fever, stomach pain, diarrhea
    - eye, ear and skin infections
    - respiratory ailments

Epi Study Thresholds for Fecal Indicator Bacteria

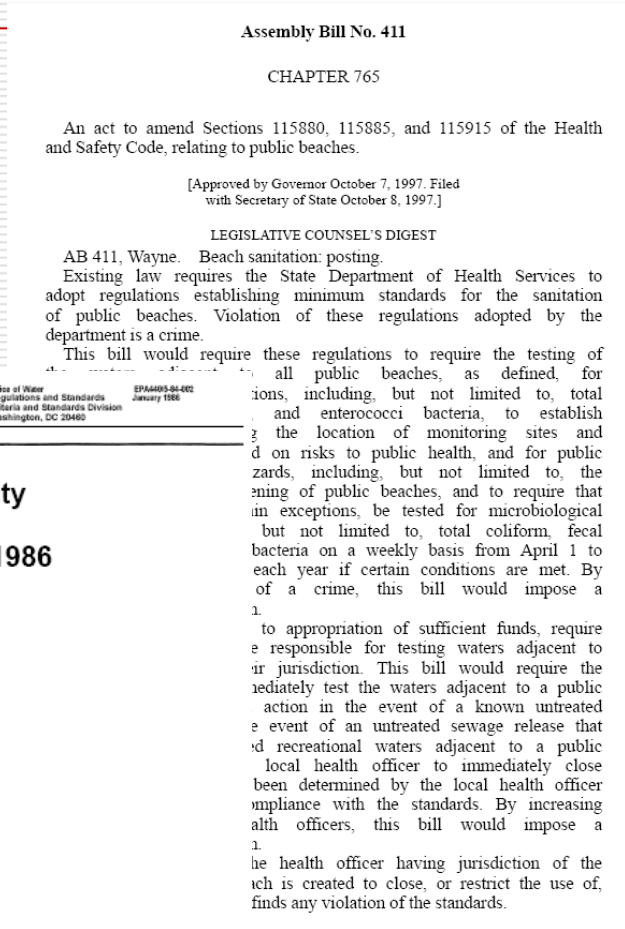
Target	**Single sample limit**	**Geometric mean limit**
Total coliform	10,000	1,000
	1,000 when F:T>0.1	N/A
Fecal coliform	400	200
Enterococcus	104	35

Health Risks Observed in SMB Epi Study

Health Risks at SSM Limits based on Santa Monica Bay Epidemiological Study		
Bacterial Indicator	***Health Risk***	***Number per 1,000***
Enterococcus	**Diarrhea with blood** **Gastroenteritis I**	**3** **13**
Total coliform	**Skin rash**	**17**
Fecal / total ratio	**Nausea** **Diarrhea** **Gastroenteritis II (Vomiting & Fever)** **Chills**	**23** **28** **10** **12**
Fecal coliform	**Skin rash**	**7**

Origins of CA Bacteria Standards for REC-1 Waters

- US EPA's CWA section 304(a) recommended water quality criteria
- CA Dept. of Health Services *minimum protective bacteriological standards* for public water contact areas



Assembly Bill No. 411

CHAPTER 765

An act to amend Sections 115880, 115885, and 115915 of the Health and Safety Code, relating to public beaches.

[Approved by Governor October 7, 1997. Filed with Secretary of State October 8, 1997.]

LEGISLATIVE COUNSEL'S DIGEST

AB 411, Wayne. Beach sanitation: posting.

Existing law requires the State Department of Health Services to adopt regulations establishing minimum standards for the sanitation of public beaches. Violation of these regulations adopted by the department is a crime.

This bill would require these regulations to require the testing of all public beaches, as defined, for ions, including, but not limited to, total and enterococci bacteria, to establish the location of monitoring sites and on risks to public health, and for public zards, including, but not limited to, the ening of public beaches, and to require that in exceptions, be tested for microbiological but not limited to, total coliform, fecal bacteria on a weekly basis from April 1 to each year if certain conditions are met. By of a crime, this bill would impose a

to appropriation of sufficient funds, require responsible for testing waters adjacent to ir jurisdiction. This bill would require the ediately test the waters adjacent to a public action in the event of a known untreated event of an untreated sewage release that d recreational waters adjacent to a public local health officer to immediately close been determined by the local health officer mpliance with the standards. By increasing alth officers, this bill would impose a

he health officer having jurisdiction of the ich is created to close, or restrict the use of, finds any violation of the standards.

United States Environmental Protection Agency

Office of Water Regulations and Standards Criteria and Standards Division Washington, DC 20460

EPA440/5-84-002 January 1986

Water

EPA

Ambient Water Quality Criteria for Bacteria - 1986

The WQS Implementation Dilemma

Bacteria is ubiquitous in the environment

- Not solely a human-caused problem
- Elevated densities observed in natural & urbanized watersheds alike

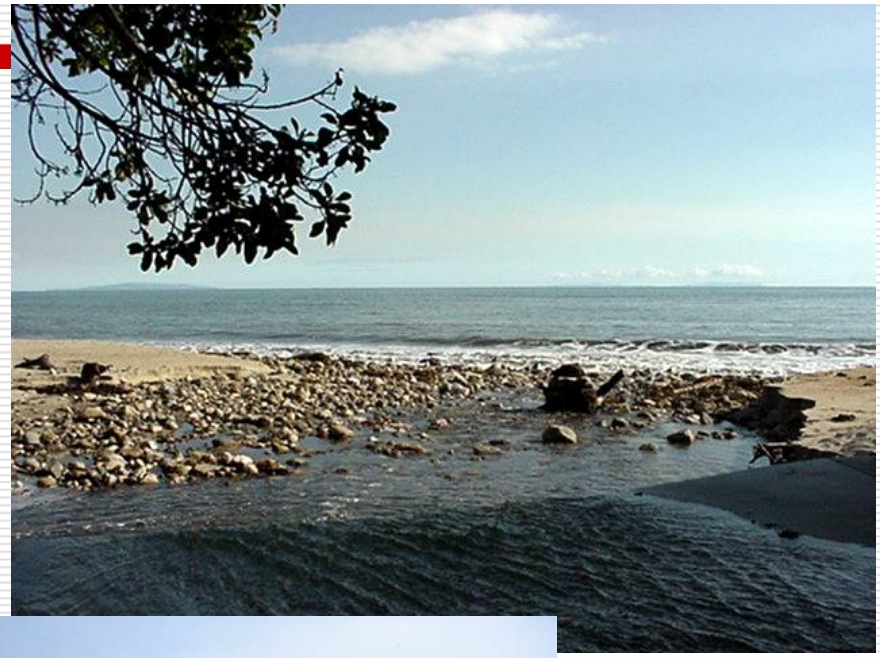
- Regional Board mission is to protect all beneficial uses
  - Sometimes uses are competing
    - Wildlife and other non-anthropogenic sources of bacteria impact REC-1 use
  - Boards need to achieve reasonable balance of protection for “competing” uses

The Dilemma (cont.)

- How do we aggressively protect the existing recreational use, while
  - acknowledging there are sources of bacteria from natural areas and
  - not requiring treatment of these natural sources, which may impact other beneficial uses?
    - CA Water Boards very concerned with preserving remaining natural streams & wetlands

The Solution: Implementation Provisions for SSM Bacteria Objectives

Reference System/ Anti-degradation Approach



Natural Sources Exclusion Approach

Why a Reference System/Antidegradation Approach?

- Water contact recreation is an existing beneficial use & must be protected, however…
- Not Boards' intent to require treatment or diversion of natural creeks, or treatment of natural sources of bacteria
  - E.g.: northern Santa Monica Bay sub-watersheds average 85% open space, but associated beaches still exceed SSM objectives

The WQS Implementation Goal

- Bacteriological water quality is at least as good as that of a natural (reference) system
- No degradation of existing water quality is allowed, where it is better than natural system

Criteria for Determining Allowable Exceedance Frequency

The Role of the Reference System and Anti-degradation

- Select smaller of two criteria based on historical data (1995-2000):
  - SSM Exceedance probability of the reference system
  - SSM Exceedance probability at a particular [beach] monitoring site

Example of Allowable Exceedance Frequency during Wet-Weather by Beach

Beach	Wet-Weather Exceedance Probability		Wet Days in Reference Year		Allowable Wet-Weather Exceedance Days
Leo Carrillo Beach (reference site)	***0.22***	*****	***75***	***=***	***17***
Surfrider Beach	**0.60**	*	**75**	=	**17**
Santa Monica Canyon	**0.33**	*	**75**	=	**17**
Santa Monica Pier	**0.46**	*	**75**	=	**17**
Manhattan Beach Pier	**0.06**	*	**75**	=	**5**
Long Point	**0.05**	*	**75**	=	**4**

Implementation Procedures: Caveats

- Does not apply to geometric mean objectives
- Does not apply to traditional point source discharges
- Implemented in context of TMDL

Natural Source Exclusion Approach

- Alternative to Reference System Approach
- Requirements
  - Control of all anthropogenic sources of bacteria
  - Identify and quantify natural sources of bacteria
- Exceedances allowed based on residual exceedance from natural sources
- Additional research on MST and CA epidemiological studies will help support approach