

WATER QUALITY STANDARD ALTERNATIVES

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– Water Quality Standards

- Foundation of CWA WQ programs
- Define goals and limits
- Determine:
 - which waters must be cleaned up,
 - how much may be discharged, and
 - what is needed for protection

WATER QUALITY STANDARD = CRITERION + USE

- Water quality criteria are
 - scientifically derived numeric values
 - that protect aquatic life or human health from the deleterious effects of pollutants in ambient water.

- States developed WQS in the 1970s
 - when the WQ problems were simpler

- Today, Evolving Science is Addressing:
 - New information
 - Local variations
 - Clarity in implementation
 - More direct measurement

CRITERIA

- An Indicator Water Quality Criterion should show a quantifiable relationship between:
 - the density of the indicator in the water and
 - the potential human health risks

- Current guidelines for freshwater pathogen criteria are based on limited historic studies:
 - USPHS - Late 1940's and early 1950's
 - Lake Michigan and Ohio River (Kentucky)
 - USEPA - 1978 – 1982
 - Oklahoma and Pennsylvania

- Conclusions of these limited studies:
 - Direct linear relationship between highly credible GI illnesses and bacterial densities the indicators – enterococci and *E. coli*
 - Fecal coliform showed no relationship to the rate of swimming-related GI illnesses
 - The criterion developed for marine bathing water is not applicable to fresh bathing water. At equivalent indicator densities, the swimming-associated illness rate was approximately 3 times greater in seawater swimmers relative to freshwater swimmers.

– Level of Risk

- In 1986, EPA recommended that *E. coli* be used as an indicator of fecal contamination in recreational freshwater.
- EPA recommended the use of a risk level associated with 8 illnesses per 1000 swimmers in freshwater
- The standard was set at a geometric mean concentration of 126 colonies per 100 milliliters (mL) of water

– Single-sample max

- used for making beach notifications and closure decisions

DESIGNATED USES

- National Research Council recommends tiered designated uses
- EPA recommends specificity of use designation

– Examples of Specific Designated Uses

– Seasonal Recreational Uses

- Where ambient air and water temperatures cool substantially in winter months
- Use less stringent secondary contact recreation criteria for incidental exposure in the “non-swimming” season
- Reduces excessive chlorination
- Formal use attainability analysis not required

- High levels of indicator organisms from animal sources
 - 1994 Water Quality Standards Handbook
 - States could justify not applying the criteria to a waterbody when bacterial indicators were found to be of animal origin
 - EPA now believes it is appropriate to account for bacteria from all non-wildlife sources in standards

- Two ways to deal with high levels of wildlife impacts:
 - Wildlife-impacted recreation use
 - Express the criteria as “non-wildlife *E. coli*”

- High levels of indicator organisms originating from environmental sources in tropical climates
 - Develop alternative indicator
 - A subcategory of recreational use with appropriate criteria to reflect these natural conditions

- Primary contact recreation in high flow situations
 - Adopt the exclusion as a condition/criteria or create a recreational subcategory that correlates to the exclusion
 - Intermittent recreational use with an extreme wet weather exclusion
 - What triggers the exclusion and for how long?
 - Waterbody-specific
 - Specific rainfall event after which the criteria may be exceeded for a limited time

Designated Use	Criteria
Primary Contact Recreation	
Identified/Popular Beach Areas	Based on risk level of 0.8% or less (freshwater)
Other Primary Contact Recreation Waters	Risk levels not greater than 1% (freshwater)
Seasonal Recreation Use	Primary criterion apply during recreation season, secondary apply the rest of the year
Secondary Contact Recreation	
Exceptions for High Flow Events	Exception to criteria at high flows on a specific waterbody based on flow statistic or number of exceedences allowed
Wildlife-Impacted Recreation	Criterion to reflect the natural levels of bacteria while providing greater protection than secondary contact recreation use

- EPA's current recommended criteria for pathogens in recreational waters (1986) were based on very limited studies
- The Beach Act of 2000 mandated that EPA develop new criteria by October 2005
- Target now is to establish a scientifically defensible criteria by 2012

EPA Research to Address Data Gaps

- Distinguishing between human and non-human sources
- Comparisons of tropical and subtropical recreational waters
- Risks to sensitive populations
- Better Indicators
- Better, faster analytical methods

EPA Research

- Conducting research until 2010
- Evaluate results
- New criteria to be issued in 2012

– EPA Recommendations for TWQS

- Limited application of criteria for solely non-human sources
- Risk Levels
- Standard Deviation
- Single Sample value percentiles
- Single Sample values for specific uses

- EPA currently recommends (2003) that states select a risk level (+or- 3) from the ranges below:

***E. coli* Criteria**

Risk Level (% of swimmers)	Geometric Mean Density (per 100 ml)	Upper Percentile Value Allowable Density (per 100 ml)			
		75 th Percentile	82 nd Percentile	90 th Percentile	95 th Percentile
0.8	126	238	299	409	578
0.9	161	301	382	523	738
1.0	206	385	489	668	940