Discussion Topic 1: Basing Criteria to be Protective of Children

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Ambient Water Quality Criteria

- 1986 Criteria: The 1986 bacteria criteria are based on indicator density (concentration) protective of the general population.
- 2012 Criteria: At a minimum EPA will base new criteria recommendations on indicator density (concentration) protective of the general population and to the extent the science supports it, recommend criteria to be protective of children

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Stakeholder Input

- EPA criteria recommendations should be protective of public health, including children
- Some stakeholders agreed that the criteria should be based on the most sensitive population, but added that it should be possible to opt out
- Others suggested a tiered approach, with different thresholds for different populations
- It may be more appropriate at densely used beaches to use criteria that are protective of children

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Current State of Knowledge

- Children may have a greater likelihood of contact with pathogens in recreational waters because they
  - Are more likely to swallow water
  - Transfer water to their mouth after exposure
  - Spend a longer time in the water

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Current State of Knowledge

- Children may be at increased susceptibility to infection and illness caused by several enteric pathogens due to
  - Differences in immune system function
  - Hygiene
  - Other physiological and behavioral differences

Current State of Knowledge

- 1983 Cabelli Lake Pontchartrain Study at brackish area with limited tidal activity
  - In general, the GI symptom rates were higher in children than adults.
- 2003 Mission Bay Study at beach with non-point source contamination (Colford et al. 2007)
  - Among all participants:
    - The strongest association with diarrhea was among children (ages 5-12).
    - The strongest association with skin rashes was among children (ages 0-5)

Current State of Knowledge

For epidemiological studies conducted by EPA at 4 Great Lakes beaches[1]:

- For individual beaches, data is only robust enough for general population analysis of GI illness.
- For all 4 combined beaches, data is robust enough to break out children 10 yrs and under.
- Combined data is not robust enough to evaluate age over 55 years or for under 5 years as a separate subgroups for estimating their illness rates.
- Children have a higher GI illness rate at individual beaches above a threshold level of enterococcus qPCR compared to adults.
  - At the lowest indicator concentrations children had a lower rate of illness than adults, however, at higher indicator concentrations children had a higher illness rate than adults.

[1] West Beach, Portage IN; Huntington Beach, Bay Village, OH; Washington Park, Michigan City, IN; and Silver Beach, St. Joseph, MI

Current State of Knowledge

- For epidemiological studies conducted by EPA at 4 Great Lakes beaches
  - 1000 swimmers exposed to 100 Enterococcus measured by QPCR would experience 34 more episodes of GI illness than nonswimmers
  - 1000 swimming children <=10 yrs would experience an average of 49 more episodes than nonswimming children.
  - As time spent in the water increased beyond 1.5 hrs, association between Enterococcus measured by QPCR and GI illness increased.
    - Children aged 5-10 yrs spent the most time in the water
      - 1.5 hours = children 5-10yrs
      - 1.2 hours = children younger than 5yrs
      - 1.2 hours = ages 11-20yrs
      - <1.0 hours = older than 20yrs
  - Risks associated with Enterococcus culture method exposure were more pronounced among children 10 and under

Remaining Analysis

- Comparison and evaluation of epidemiological study designs (non-EPA studies) for determining children's health effects associated with recreational water exposure.
  - Studies such as those conducted by SCCWRP which utilize study designs similar to EPA's and also studies conducted in Europe and the U.S. that used different study designs will need to be evaluated to determine if result data can be compared to NEEAR results regarding illness rates for children.

Remaining Analysis

- Evaluate 2007 EPA marine epidemiological studies (individually and combined) to determine if data are robust enough to break out children's GI (and other health endpoints) illness rates.
  - Fairhope, AL
  - Goddard, RI
  - Biloxi, MS
- Evaluate 2009 EPA tropical and urban run-off epidemiological studies to determine if data are robust enough to break out children's GI (and other health endpoints) illness rates.
  - Boqueron, PR
  - Surfside Beach, SC
- Evaluation of water quality samples and other fecal indicator relationships to GI (and other health endpoints) illness from archived filters for children.

Possible Approaches

1. Criteria value (indicator concentration) at the level that protects the general population.
2. Criteria value (indicator concentration) at the level that protects children (as well as the general population).
3. Criteria value (indicator concentration) protects an upper percentile of the general population thereby ensuring children are also protected.

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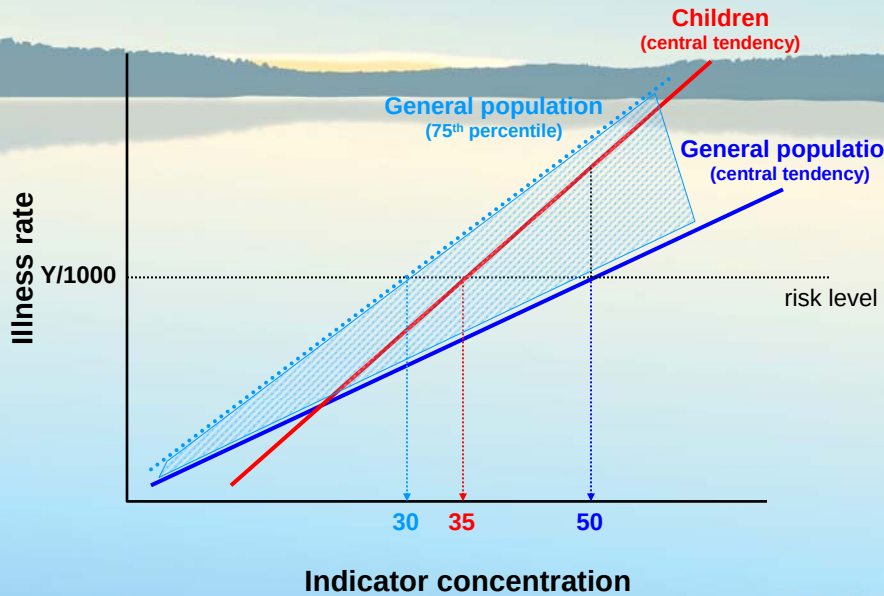

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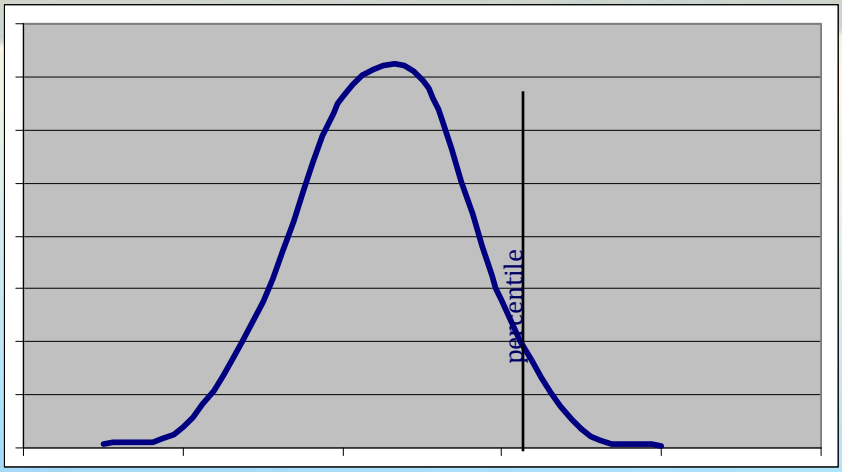
Possible Approach (3)

Criteria value protects an upper percentile of the general population, thereby protecting children



Questions for Panel and Audience

- What are the trade-offs of the different approaches presented by EPA?
- Is criteria based on some percentile for the general population a reasonable approach to be protective for children?
- Are there other approaches you are aware of for EPA to consider?
- Are there other beach management practices that could be implemented to protect children?
  - Are there other risk management practices to protect children?