Discussion Topic 3: Sources of Fecal Contamination & Site-Specific Considerations

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1986 Ambient Water Quality Criteria

- Do not differentiate based on sources of fecal contamination
  - "these values apply regardless of origin"
- Criteria apply unless:
  - "a sanitary survey shows that sources of the indicator bacteria are non-human AND an epidemiological study shows that the indicator densities are not indicative of a human health risk".

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Current Thinking for 2012 Criteria

- Develop numeric criteria based on indicators of fecal contamination regardless of source.
- State would be able to develop and adopt regional, state, local or site-specific criteria
  - With epi study backed by sanitary survey, or
  - Other tools such as QMRA with enhanced sanitary investigation

Stakeholder Input

- Concern the 1986 criteria are "overprotective" in some situations and result in significant resource expenditures
  - Criteria exceedance due to non-enteric or animal fecal indicator sources that may not be correlated with human health effects.
  - Brief periods of time (few days) of criteria exceedance due to wet weather events.
- Prefer revised criteria to include options for applying different criteria values to waters with sources of fecal contamination that science shows are less risky than human sources
- Prefer EPA address how states should handle water body and source conditions different from those used to develop criteria (primarily POTW-impacted sites)

Current State of Knowledge

- Common sources of fecal indicator bacteria in ambient waters are:
  - POTW effluents
  - non-treated human sources (septic systems and CSOs)
  - animals (livestock and wildlife)
  - environmental habitats (sand, sediment)
- Different Pathogens/Different Potential Risks
  - Pathogen type and numbers vary among and within different fecal sources.
  - Only a limited number of human pathogens are associated with animal sources
    - Some organisms cause very severe diseases compared with the GI endpoint observed in epi studies.
  - POTW secondary treatment and certain disinfection techniques are not as effective for other classes of pathogens (viruses and protozoa) as compared to bacteria.

Current State of Knowledge (2)

- Epi studies have observed GI illness, but have not examined etiology
- Mission Bay, CA epi study
  - Mainly wildlife/avian sources
  - GI illness only correlated with the presence of the human bacterial marker and not with general indicator increases
  - Other wildlife/avian epi studies are currently being conducted which may or may not support the Missions Bay study results.
  - Limited information on sand contamination and bather load collected but not main focus of EPA epi studies.
    - More recent studies by others suggest a relationship and possible implication of sand exposure and health, but unclear on the relationship to water quality.
- To date, EPA has not identified available data to allow us to definitively develop criteria values for waters impacted by different fecal contamination sources.

Relevant EPA Activity Highlights

- Development of markers for human and bovine sources
- Data collection for agricultural animal Quantitative Microbial Risk Assessment (QMRA) for swine, poultry and cattle
- Data Collection and QMRA at POTW impacted site in tropical region in Boquerón, PR
- Urban Runoff epi study at Surfside, SC
- Sanitary survey/site characterization information collection for tropical POTW-impacted (Boquerón, PR) and urban runoff (Surfside, SC) beaches for use in QMRA
- Development of QMRA tool for use by states/stakeholders to use to incorporate site-specific considerations.

Relevant Activity Highlights – Non-EPA Studies

- SCCWRP epi study of shore bird/urban-runoff/non-POTW impacted site at Doheny, CA and shore bird/mixed sources site at Malibu, CA
- WERF project - Quantification of pathogens and sources of microbial indicators for QMRA in recreational waters
- University of Miami epi study (mixed urban sources)

Remaining Questions

- Is there a difference in risk between human and animal sources?
  - What hard science has been developed since the 2007 Experts Scientific Workshop at Arlie that informs this?
- Can we scientifically demonstrate and quantify such a risk difference?
- Can tools, such as sanitary surveys, source tracking, etc. allow us to confidently identify sources and estimate their relative influence (i.e., what percent risk do they contribute)? What about mixed sources?

Possible Approaches (1)

- Develop a criteria value used to protect recreation regardless of source based on POTW-impacted epi studies.

  - States could develop and adopt site-specific criteria that are scientifically defensible and protective of the swimming use.

Possible Approaches (2)

- If data are available and definitively show differences in risk from different sources*, EPA may develop distinct criteria values to be applied to waters that are impacted by different sources of fecal contamination
  - Rely on sanitary investigations and possibly source markers to demonstrate which sources are present/absent.

** No data identified to date*

Possible Approach (3)

- Approach 1, plus EPA would develop a tool (with default data) to provide to states and other stakeholders for performing site-specific QMRA in conjunction with an enhanced sanitary investigation.

Questions for Panel and Audience

- What has been your experience regarding identification of sources through sanitary investigations and/or source tracking studies? Have you found it easy or difficult to use these methods? Why?
- If EPA were to develop a QMRA tool (populated with default data) for use by states/stakeholders, what are the opportunities and challenges in using such a tool for addressing site-specific conditions? How can EPA make this tool most useful? What data is the most difficult/costly for states to obtain (e.g., infectivity, dose, fate and transport, exposure duration, fecal indicator concentration)?
- EPA has heard concerns that the 1986 criteria are over or under protective when applied to water bodies impacted by non-human sources. What has been your experience? And did you draw any conclusions about over or under protection? If so, based on what data?