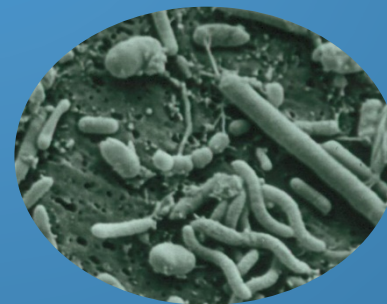


# FECAL INDICATOR BACTERIA SAMPLING STRATEGIES AND LESSONS LEARNED

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COUNTY OF SANTA CRUZ  
**Health Services Agency**



# PRESENTATION OVERVIEW

- Comparing notes on sampling
- Staffing models
- Sampling logistics
  - Preparation
  - Containers
  - Quality Assurance
  - Transport
- Potential interferences and complications
- Tricks-of-the-trade



# BASIC CONCEPTS

- Goals of sampling
  - Obtain accurate data
  - Provide timely information to protect public health
  - Determine potential sources of contamination
- Guiding principles
  - Representative sample
  - Maintain sample integrity
  - Prevent contamination sources
- Location
  - Reflect likely exposure pathways
  - Seek common access points
- Timing
  - Early in day to avoid potential interferences from UV light
  - Tide considerations
  - Consider potential impacts from weather events
  - Early-to-mid week to provide data in advance of weekend and to allow for resampling





# DISCUSSION OF STAFFING MODELS

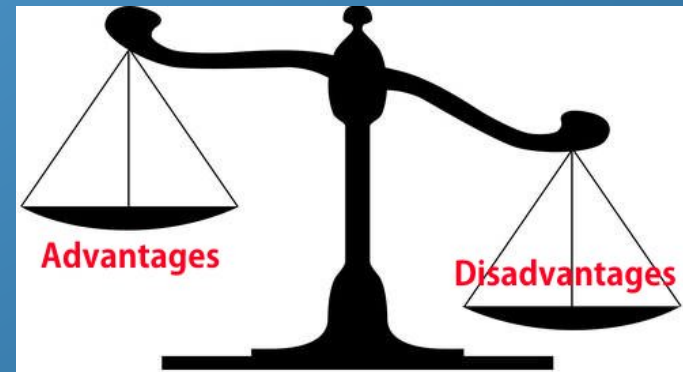
- Functions

- Sampling
- Laboratory processing (ELAP certification)
- Data interpretation
- Data management
- Field investigations and posting of beaches

- Example Scenarios

- Specific functions
  - Dedicated sampling staff
  - Dedicated laboratory staff
- Volunteer samplers with laboratory support
- Hybrid model

- Advantages and disadvantages



# SAMPLING LOGISTICS

- Maintain sample integrity
- Minimize contamination sources
- Minimize transport time
- Avoid potential sources of interference
  - Before Sampling
  - During Sampling
  - During Sample transport
  - During Sample processing



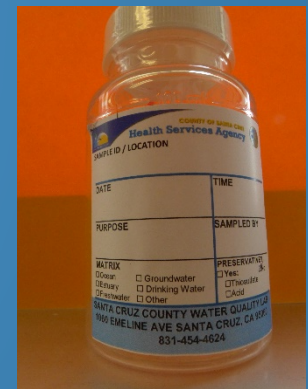
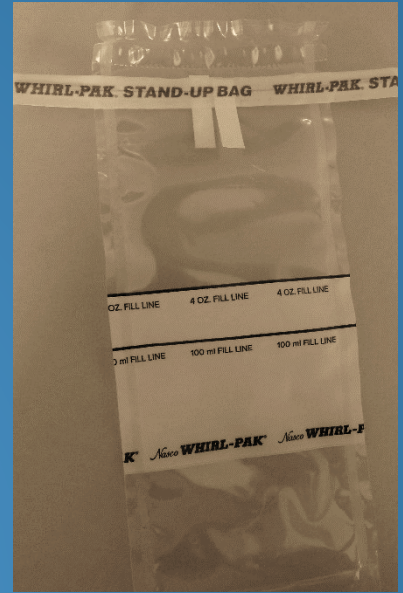
# SAMPLE CONTAINERS

- Guidelines

- Sterile
- Robust
- Easy to handle
- Access to water (shore, pier, etc.)
- Minimize transfers from container-to-container
- Failsafe labeling system
- Avoid interferences—plasticizers, fluorescence, etc.

- Options

- Commercially available bags or bottles
- Sterilized reusable containers
- Non-sterile containers that are pre-rinsed in water source





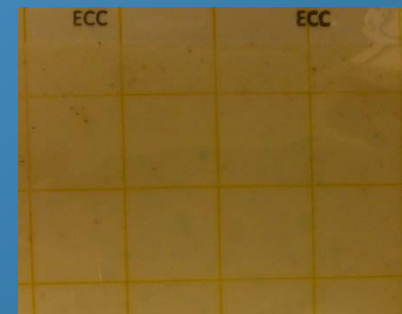
# WHAT ABOUT PRESERVATIVES?

- Review overarching goals of sampling
  - Obtain accurate and representative data
  - Provide timely information to protect public health
  - Determine potential sources of contamination
- Why are preservatives added to water samples?
  - Quench residual chlorine in drinking water samples
  - Prevent volatilization of dissolved compounds (e.g. ammonia, VOCs, hydrogen sulfide, etc.)
  - Prevent biological reactions (e.g. nitrification, denitrification)
- Relevance to goals of beach sampling?



# TEST OVERVIEW

- Total coliform/E. Coli test
  - Defined Substrate
  - Membrane tests
- Coliform concentrations are determined from a color change and evidence of fluorescence
  - Defined substrate
    - Total coliforms— Yellow (35 C incubation)
    - E. Coli— Yellow and Fluorescence (35 C incubation)
    - Fecal (thermotolerant) coliforms Yellow (45 C incubation)
  - Membrane filtration
    - Count colony forming units
    - Colonies display specific characteristics





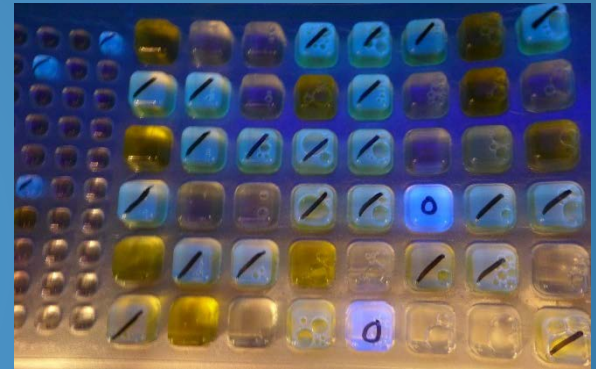
# POTENTIAL COMPLICATIONS

- Inter-relationships

**Total Coliforms  $\geq$  Fecal Coliforms  $\geq$  E. Coli**

- Potential Interferences

- Imposter bacteria
- Other sources of fluorescence



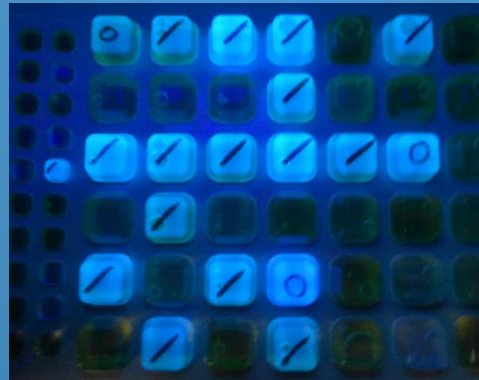
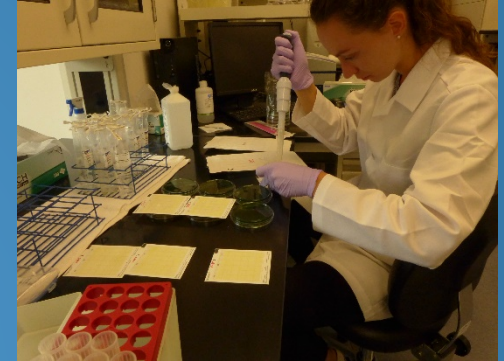
- Consequences

- Under-reporting—false negatives
- Over-reporting—false positives
  - Beach advisories
  - Confusion



# DISCUSSION

- Comparing notes
- Tricks-of-the-trade
- Other uncertainties
- Next Steps



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