

# Cryptosporidium and Giardia Recoveries in Natural Waters Using EPA Method 1623

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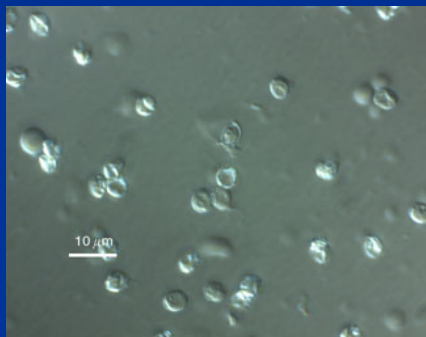
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## What are Cryptosporidium and Giardia?

Cryptosporidium



Giardia



Photo Credit: H.D.A Lindquist, U.S. EPA

## Why Study Crypto & Giardia?

- **Serious Health Effects-**
  - Healthy immune system
  - Compromised immune system
- **Disinfection**

Resistant or unaffected by traditional drinking water disinfection methods.

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## Evolution of Detection Methods

- **ICR Methodology (Information Collection Rule.)**
  - High losses throughout the method.
  - Problems with false (+s) and (-s).
  - Results highly variable.
- **Method 1622 and Method 1623**
  - Improvements over ICR.
    - Quantified filter pore size.
    - Better recoveries throughout the technique.
    - Able to quantify the entire volume of water collected.

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## Purpose of Our Study

- **Examine Method 1623's capabilities in our natural waters. Interested in:**
  - Filtration capacity
  - Recovery
  - Performance of the method at environmentally realistic spiking doses

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## Methods-Filtration capacity

- Used a Gelman Envirochek™ capsule filter and a Gelman High Volume (HV) Envirochek™ filter.
- Used 3 replicates per filter type.
- Measured total volume able to pass through each filter at a low and high ambient turbidity.



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## Methods-Recovery of Cryptosporidium and Giardia



Sampled



Composited



Spiked & mixed



Filtered

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## Results-Filtration Capacity Volumes

Sample Site	Turbidity (NTU)	Average Volume Filtered (liters) $\pm$ SE	
		High Volume	Standard
Campbell Lake	88	3.2 <sup>a</sup> $\pm$ 0.19	1.7 <sup>b</sup> $\pm$ 0.32
Sacramento River at Hood	99	7.0	4.0
Bethany Reservoir	11	10	10
Barker Slough Pumping Plant	36	10	NA
Barker Slough Pumping Plant	47	5.0	NA

Means with the same letter(s) are not significantly different, t-test,  $p = 0.008$ .

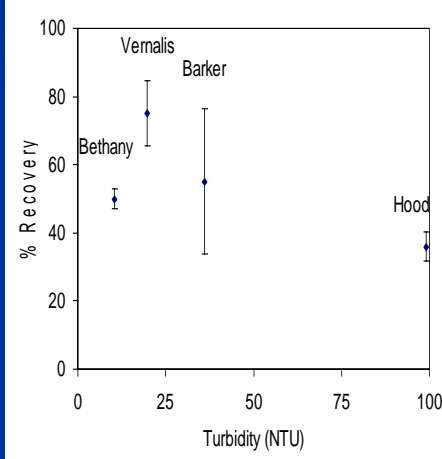
NA = not analyzed

SE could not be calculated for filter capacity comparisons in matrix spike experiments.

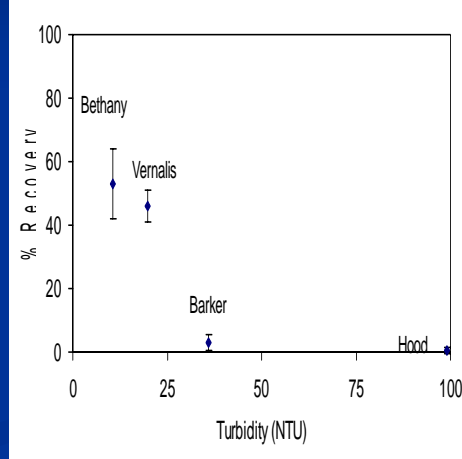
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# Results-Method Recovery in Different Ambient Waters

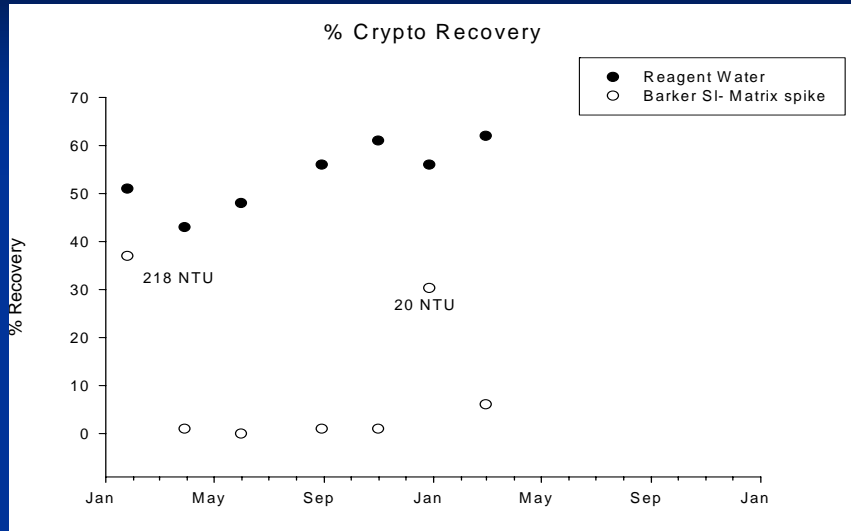
Cryptosporidium oocysts



Giardia cysts



# Matrix Effects



## Results

	Overall avg. recovery (%)	
	Our study	ICRSS
Cryptosporidium	54	43
Giardia	25	53

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## Conclusions

- HV filter does a better job than standard Envirocheck filter, but not perfect.
- Poor filtration capacity under high turbidity situations means the Method compromised when you need it most.
- Matrix composition of the water important factor driving recovery.

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## Conclusions-cont'd

- Cost prohibitive.
- Statistical problems associated with a field study.
- Unable to differentiate between living and non-living oocysts as well as non-infective strains.
- State of the science needs to advance further before the method can be used as a routine monitoring tool.

[next](#)