

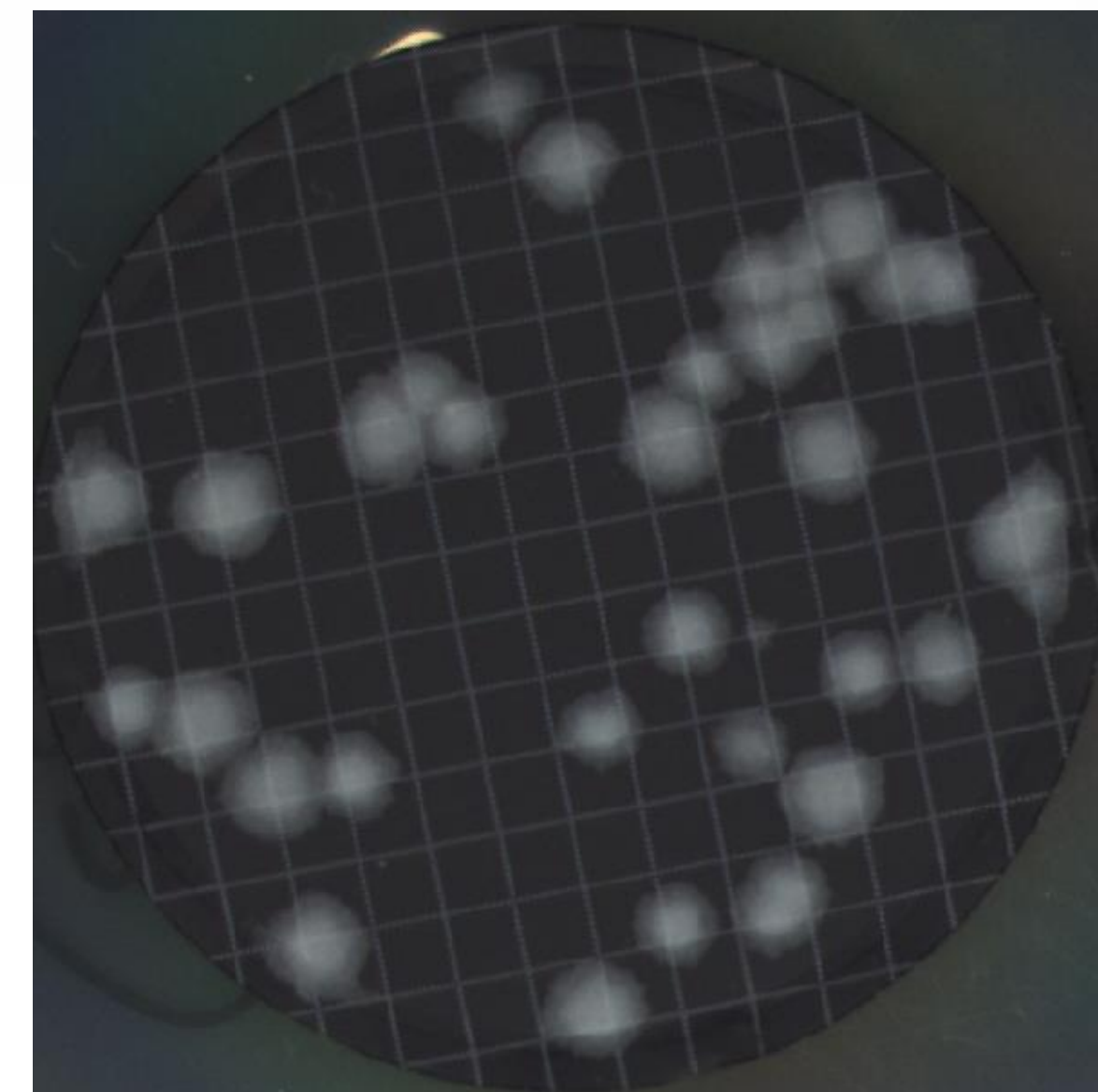
Background



Environmental sampling is a critical component of the post decontamination procedure following a bioterrorism event. Following the 2001 Anthrax letter attacks, 125,000 samples were tested by the Laboratory Response Network (1). Remediation of the areas affected by these attacks took years to complete with some of the most time intensive tasks including environmental sampling and sample analysis (2). Any future incidents involving the release of *Bacillus anthracis* (Ba) spores will likely require extensive environmental sampling.

Figure 1. Cellulose Sponge Surface Sampling

Environmental surface sampling for *Bacillus anthracis* spores following the 2001 attack included a variety of techniques and implements including swabs, wipes, and vacuum socks (8). Following the 2001 incident numerous research teams have studied the recovery efficiency for several sampling methods using different techniques, as well as, materials and devices for collection including swabs, wipes, and vacuums for *Bacillus anthracis* spores or surrogates (4, 5, 6, 7). The goal of this work was to produce a less labor-intensive method for processing sponge-wipe samples. This method, referred to as the "Fast Analysis" method, was designed to quickly and efficiently enumerate low-concentration (i.e., post-decontamination) clearance sponge-wipe samples. In 2011, Rose and colleagues published "National Validation Study of a Cellulose Sponge Wipe-Processing Method for Use after Sampling *Bacillus anthracis* Spores from Surfaces" (3). The Fast Analysis method was compared to the method used by Rose et al., (3) known hereafter as the "CDC method", for the average recovery of spores, labor times and waste generation. Each method was evaluated against three different spore loading levels (i.e., spore surface concentrations), and processed by three different analysts.



Materials and Methods

Sponge Wipe Processing: CDC vs. Fast Analysis

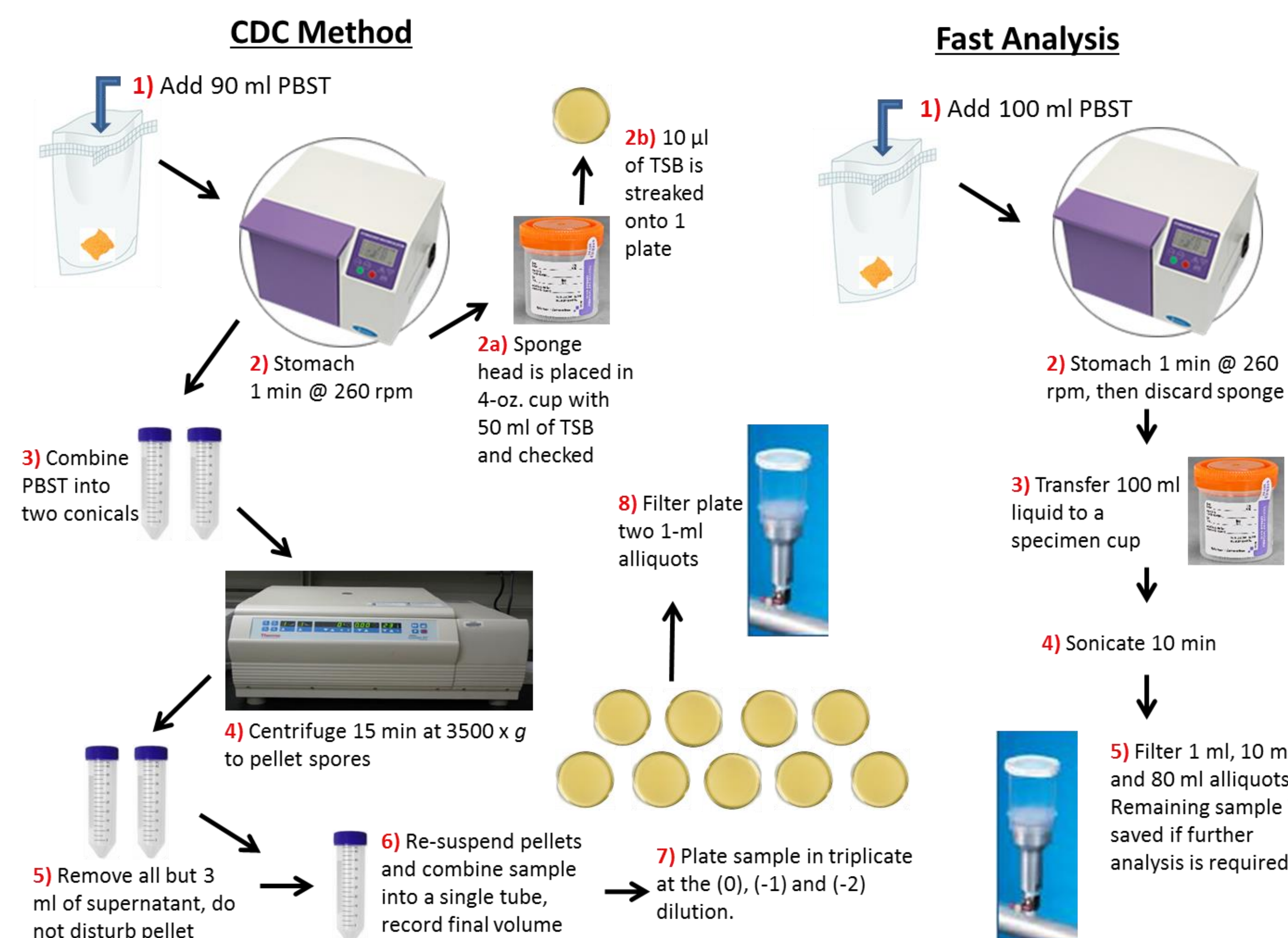


Figure 3. Sample Processing Flow Chart: Fast Analysis vs. CDC Method.

Results

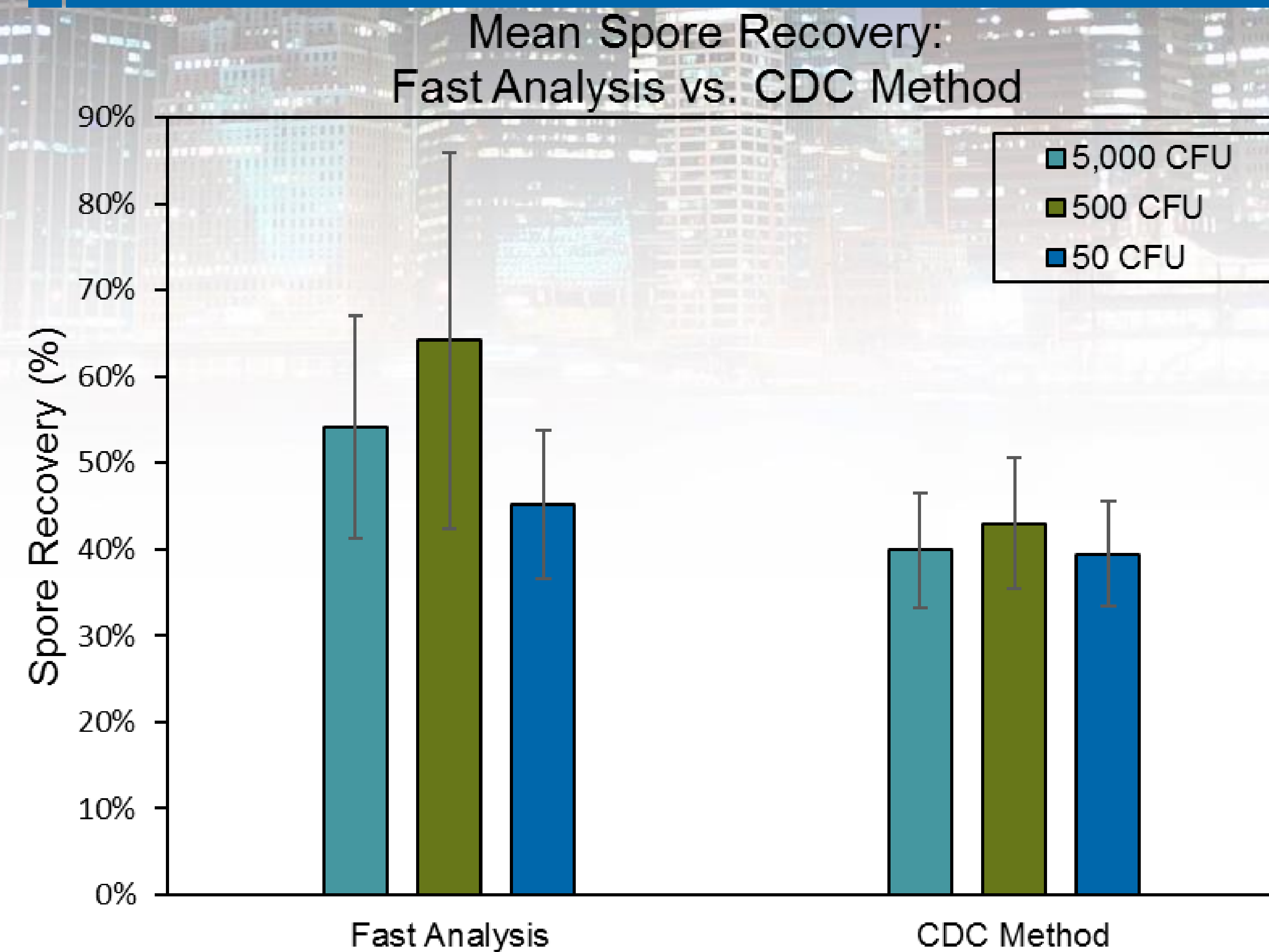


Figure 4. Mean Spore Recovery: Fast Analysis vs. CDC Method.

- Fast Analysis mean recoveries: 54.2 ± 12.9, 64.2 ± 21.7, and 45.2 ± 8.6%
- CDC method mean recoveries: 39.9 ± 6.7, 43.0 ± 7.6, and 36.8 ± 10.1%
- Overall, mean recovery of 54.4 ± 17.0 % for the Fast Analysis method compared to 39.9 ± 8.5% for the CDC method (p-value <0.007)
- Mean processing time per sample for the Fast Analysis and CDC method: 10.6 ± 1.6 and 22.1 ± 1.1 minutes, respectively
- Mean waste generation per sample for the Fast Analysis and CDC method: 1.2 lbs./sample and 2.5 lbs./sample, respectively

Waste Generation per 9 Samples (1-Test) Fast Analysis vs. CDC Method

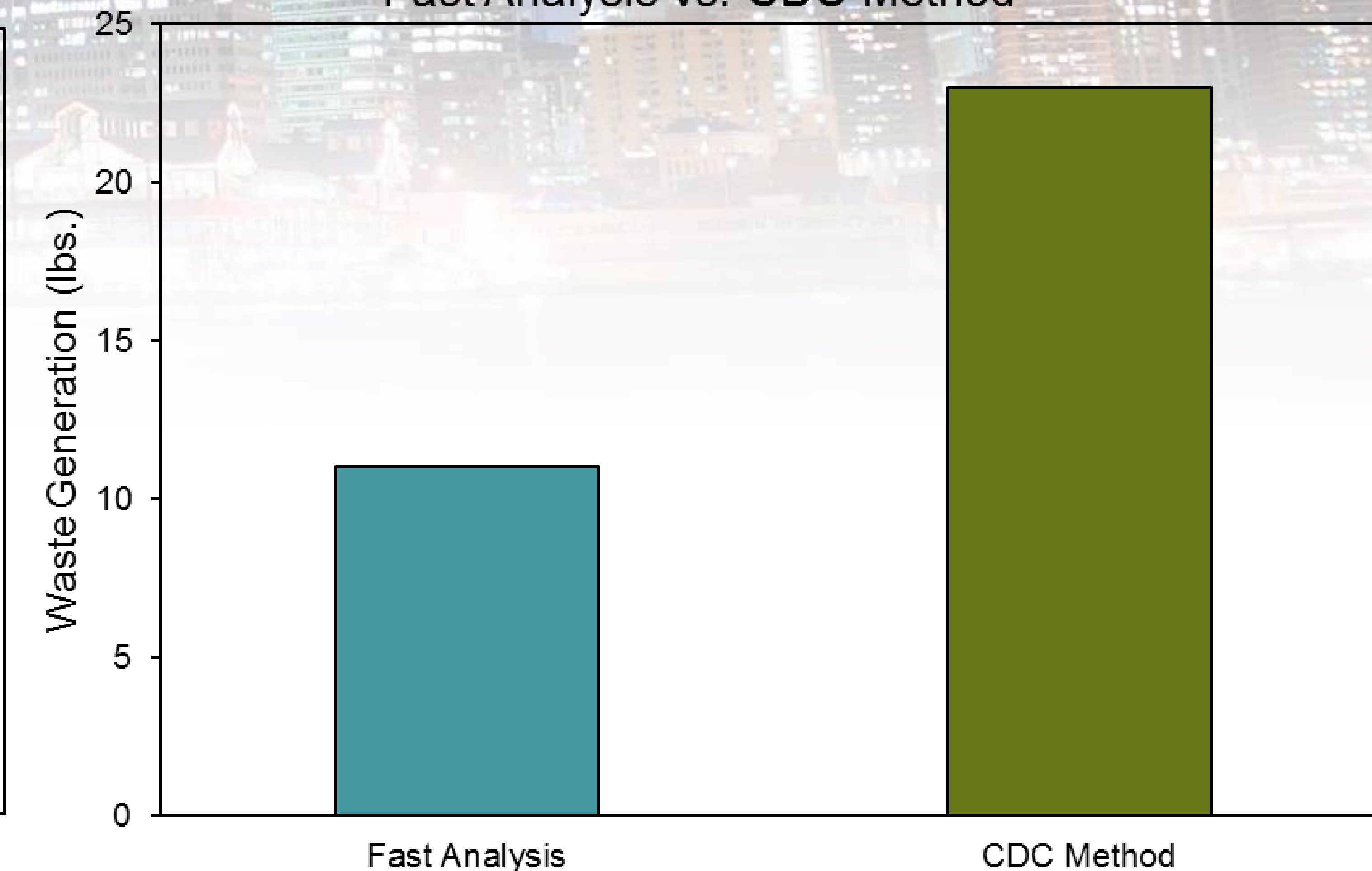


Figure 6. Hazardous Waste Generation: Fast Analysis vs. CDC Method

Highlights

- The Fast Analysis Method:
 - Provides the ability to process twice as many samples in the same amount of time
 - Provides higher mean percent recovery
 - Generates less than half of the amount of hazardous waste
 - Generates potential savings of \$16,650 in labor costs and \$12,337 in waste disposal per 1,000 samples

Future Work

- Evaluate method using real world samples with grime and background organisms
- Evaluate method with *Bacillus anthracis* and blood agar plates
- Evaluate method with post-decontamination samples

References

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Average Processing time per sample: Fast Analysis vs. CDC Method

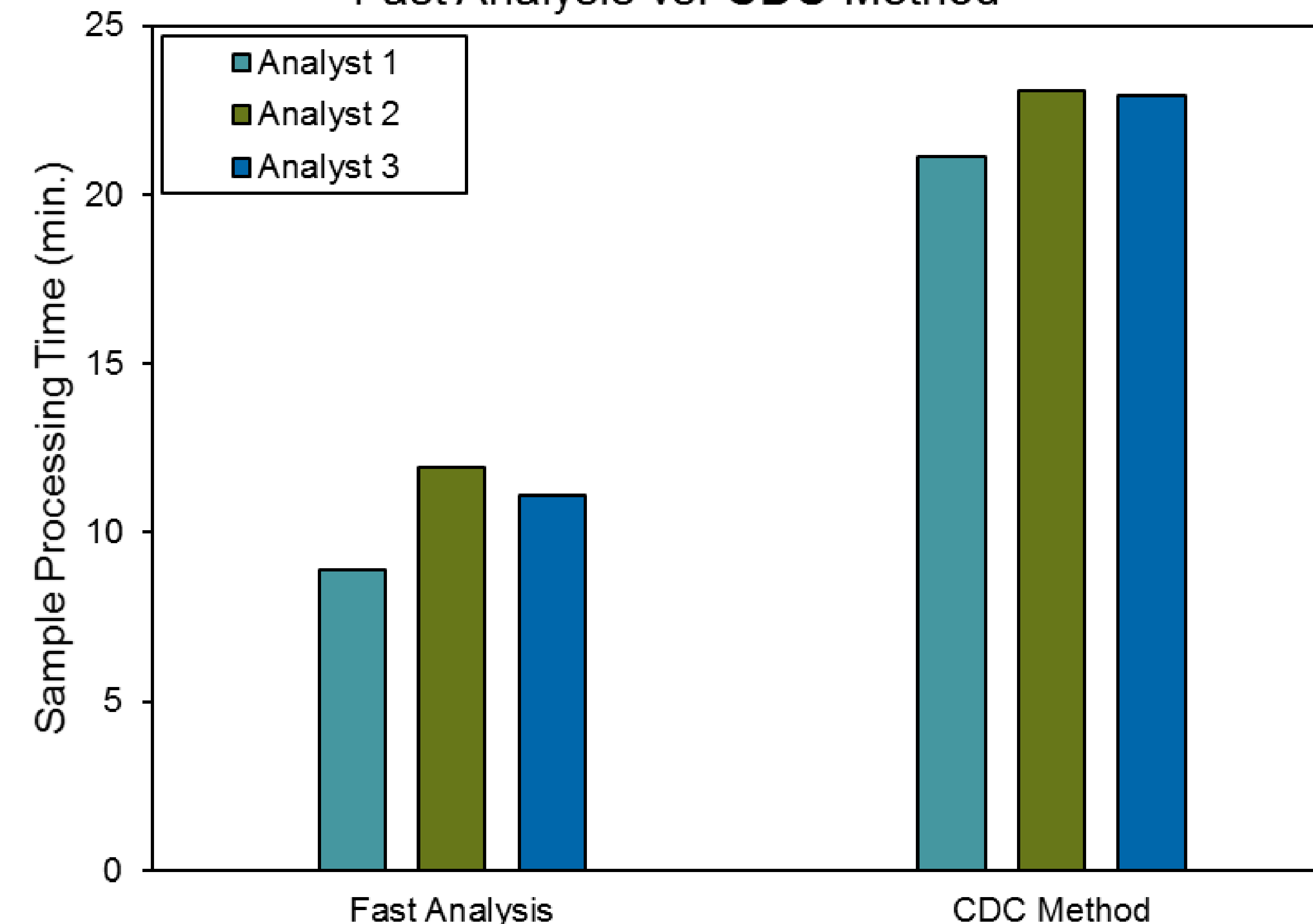


Figure 5. Average Processing time per sample: Fast Analysis vs. CDC Method