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Evaluation of optical brightener photodecay characteristics for the detection of human fecal contamination

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ABSTRACT

Detection of optical brighteners (OBs) by fluorometry combined with ultraviolet (UV) light exposure has been proposed as an inexpensive method for the detection of human fecal contamination, but this approach has received limited testing. This study evaluated the approach in southern California by applying it to a variety of detergents, sewage, and septage samples from the region, as well as to natural stream water as a negative control. The concept of using UV exposure to differentiate fluorescence from natural organic matter proved valid, as the method produced no false positives. However, the method failed to detect half of the detergents tested in natural stream water at 5 µl/L, due to its conservative thresholds. This study identified a method modification that allows lower thresholds by taking advantage of differences in shape of photodecay curves between OBs and natural organic matter. This method modification resulted in detection of all detergents, sewage at 1:10 dilution and septage at 1:100 dilution. However, several caveats for its use remain, as the OB signal degraded rapidly in strong sunlight. Additionally, low sensitivity for some environmentally-friendly detergents was observed, which does not present a problem on a community basis where a mix of detergents are used, but could be of concern for assessing septic inputs from individual homes.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2008AnnualReport/AR08_145_152.pdf