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DETERMINATION OF CAFFEINE AS A MARKER FOR SEPTIC TANK CONTAMINATION OF WILGREEN LAKE

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Wilgreen Lake in Richmond, Kentucky, has been listed by both the state and the Environmental Protection Agency as an “impaired” lake due to excess nutrients, which may be in part contributed by domestic septic systems. Caffeine can be used as an anthropogenic marker to estimate the contribution of septic tank effluent to the lake. We have modified existing analytical methods to produce a viable method for the determination of caffeine in environmental water samples and applied the method to water samples collected from Wilgreen Lake. The modified method allows determination of caffeine in a concentration range of 75 to 10,000 ng/L in the water samples. Waters Oasis® HLB solid phase extraction cartridges are used to clean up and concentrate the water samples, which are then analyzed by liquid chromatography-tandem mass spectrometry. A Waters XTerra MS C18 column (3.5 µm film thickness, 2.1 x 100 mm column dimensions) is utilized in the separation. Carbon-13 labeled caffeine is added to all samples prior to extraction and serves as an internal standard. The parameters of the optimized method and results of the application of this method to water samples collected from Wilgreen Lake will be presented.

Kentucky Water Resources Research Institute Annual Symposium, 21 March 2011, pp. 99.