Large Volume Automated Sample Collection Techniques for Determination of Enteric Viruses in Water

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Viruses are thought to be the cause of many waterborne diseases contracted from fecal-contaminated waters. Collection of samples that properly represent virus concentrations throughout relevant hydrologic periods has historically been difficult due to requirements of the sampling process. During this project, an automated process control system was developed to allow for unattended virus sample collection over extended duration sampling periods. Stream water was pumped through the system at specified rates, and pH was monitored and modified to optimal levels that optimize virus recovery within the filter. A pre-filter is used to remove large solids upstream of a glass-wool filter for removal of viruses in the water stream. Internal pressure was monitored for assessment of filter blockage and flow was switched to a second filter when necessary. This automated sampling system was triggered to begin and end sampling through telemetry and programmed to collect streamflow-weighted composite samples. Results from virus analyses provide event-mean concentrations of adenoviruses, enteroviruses, rotavirus, hepatitis-A virus, and noroviruses. Up to 2,800 liters of water have been filtered through an individual filter and each of the viruses has been detected at least one time after one year of data collection from three different sampling locations.

Keywords: streamflow, adenoviruses, enteroviruses, rotavirus, hepatitis-A, noroviruses

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