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Attachment and Detachment Behaviour of Adenovirus and Surrogates in Fine Granular Limestone Aquifer Material

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Comparison of transport of virus surrogates to the pathogenic virus is necessary to understand the differences between the virus and surrogate. Since experiments using pathogenic viruses cannot be done in the field, laboratory tests using flow through soil columns are used. Adenovirus, nanoparticles, PRD1 and MS2 bacteriophages were tested in fine granular limestone aquifer material taken from a borehole at a managed aquifer recharge site in Adelaide, Southern Australia. Results show that PRD1 is the most appropriate surrogate for adenovirus in an aquifer dominated by calcite material, although PRD1 did not mimic the detachment behaviour of adenovirus successfully under high pH conditions. It was also found that the charge of the colloid is not a dominant removal mechanism in this system. Implications from this study could influence how field tests using bacteriophages and nanoparticles are interpreted.