Supplement 1:

The Peclet number, N_{pe}, representing attachment due to colloid diffusion, is defined as:

$$N_{Pe} = \frac{U d_c}{D_p}$$

where U is the approach velocity (Darcy velocity), $U = v\theta$; D_P is the diffusion coefficient of the particle (colloid), computed from

$$D_P = \frac{k_B T}{3\pi\mu d_p}$$

k_B is the Boltzmann constant (1.38×10^{-23}), T is the absolute temperature in Kelvin, μ is the dynamic viscosity of water at temperature T (9.4×10^{-4} Pa· s at 296°K), and d_p is the diameter of the particle (*C. parvum*: 5 µm).

The interception number, N_R, is the ratio of particle diameter, d_p, to collector diameter, d_c. The gravitation number, N_G, represents attachment due to sedimentation and is defined by:

$$N_G = \frac{g(\rho_p - \rho_f)d_p^2}{18\mu U}$$

where g is the gravitation constant (9.81 m s^{-2}), ρ_p is the density of the particle (*C. parvum*: 1050 kg m^{-3}), ρ_f is the density of the fluid (water at 296°K: 999 kg m^{-3}). Finally, the London - van der Waals constant, N_{Lo}, represents attachment due to attractive London-Van der Waals forces:

$$N_{Lo} = \frac{4H}{9\pi\mu d_p^2 U}$$

where H is the Hamaker constant, $H = 1E-20$ kg m^2 s^{-2}. The correction factor As is defined as

$$A_s = \frac{2(1-\gamma^5)}{2 - 3\gamma + 3\gamma^5 - 2\gamma^6}$$

where $\gamma = (1 - \theta)^{1/3}$.

Supplement 2: Detailed major ion analysis of the aqueous solution used for the column experiments. The solution is untreated tap water supplied by a local groundwater well. Concentrations in [mg/l].

Hardness (as $CaCO_3$)	65	Alkalinity (as $CaCO_3$)	72
Calcium	18	Bicarbonate	72
Magnesium	5	Sulfate	6.0
Sodium	13	Chloride	6.0
Potassium	2.3	Nitrate	6.0

Supplement 3:

Assuming clean-bed filtration and a Δt = 2.5 p.v. injection of oocysts, the total filtered oocyst concentration s at a given distance x from the source after large time is:

$$s(x,t \rightarrow \infty) = \int_0^\infty \frac{\partial s(x,t)}{\partial t} dt$$

where s is the sorbed concentration at distance x from the source at time t. The change in s over time is defined by the clean-bed filtration model as:

$$\frac{\partial s(x,t)}{\partial t} = v\lambda c(x,t)$$

Approximating the breakthrough curve, $c(t,x)$, by a step function of duration Δt ($\Delta t \gg 1$ p.v.) such that the outflow concentration is $c_{max}(x)$ during the interval $[t, t+\Delta t]$ and zero otherwise, we integrate and obtaine, using eq 7, $c_{max}(x) = c_o \exp(-\lambda x)$:

$$s(x,t \rightarrow \infty) = v\lambda c_0 \exp(-\lambda x)\Delta t$$

Taking the logarithms on both sides, we find for the gradient of log sorbed concentration:

$$\frac{\partial \ln s(x,t \rightarrow \infty)}{\partial x} = -\lambda$$

That is, the negative slope of the logarithm of the sorbed oocyst concentration after the completion of column breakthrough is equal to the filtration coefficient if clean-bed filtration can be assumed (no reversible attachment). In our experiments, profile concentrations are considered less reliable than BTC concentrations due to the analytical difficulties associated with collection of oocysts from sand material.