



O'Kelly, B. C. (2018) Geotechnical laboratory testing and data interpretation for biosolids and sewage sludge. *Geotechnical Research*, Volume 5, Issue 4, pp. 247–261, <https://doi.org/10.1680/jgere.18.00009>

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<https://doi.org/10.1680/jgere.18.00009>

Abstract:

Biosolids and sewage sludge are difficult, challenging and unconventional geomaterials with some distinctive properties, including extremely high water content and plasticity; low particle density; high organic content; very high compressibility, creep and strain rate dependence of strength; a viscous gel-like pore fluid phase; extremely low permeability coefficient; and a propensity to degrade, producing copious amounts of biogas. The geotechnical properties and behaviour of these materials have been comprehensively reviewed in a companion paper previously published in this journal. The purpose of the present review paper is to describe necessary procedural modifications to standard geotechnical laboratory test methods, including associated analyses and data interpretation procedures, to obtain meaningful determinations of their index, compaction, compression, consolidation and permeability properties and their undrained and effective-stress strength parameter values. Specific aspects investigated include a modified curve-fitting technique for interpreting oedometer strain–time data, rapid and accurate means for undrained strength measurement and the significance and effects of ongoing biodegradation for long-term tests, as well as the corrosive nature of these materials. Many of the procedural modifications to geotechnical laboratory testing and nuances in the data interpretation presented in this paper should be transferable to the testing of other biodegradable soil and soil-like materials.