



Dr. Joseph Scalia

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Dr. Joe Scalia is an Assistant Professor in the Department of Civil & Environmental Engineering at Colorado State University (CSU) specializing in geoenvironmental and geotechnical engineering. Dr. Scalia's research and teaching are focused on geoenvironmental and geotechnical engineering. Research activities leverage a combination of applied field, laboratory, and computational work.

Dr. Scalia's main research thrusts are:

- Environmental containment systems
- Transport and fate of contaminants in the saturated and unsaturated porous media
- Unsaturated soil mechanics
- Tailings & mine waste

Dr. Scalia received his Ph.D. and M.S. Degrees in Geological Engineering from the University of Wisconsin-Madison, and B.S. in Civil & Environmental Engineering from Bucknell University. Prior to joining CSU, Dr. Scalia was a Senior Associate at Exponent (formerly Failure Analysis Associates) in the Environmental and Earth Sciences Practice in Bellevue, Washington, and Natick, Massachusetts.



Dr. Scalia's research team at CSU's Center for Contaminant Hydrology is a team of interdisciplinary geoscientists and civil, environmental, geological, and chemical engineers focused on innovative solutions to geoenvironmental problems. Current work includes: enhancing oleophilic biobarrier (OBB) remedies for non-tidal sediments;

- use of IoT sensors to demonstrate OBB performance (an example photograph is shown on bottom-left of page);
- identification and validation of remotely operated screening methods for assessment of embedded oil in sediments;
- understanding the longevity of benzene at LNAPL hydrocarbon impacted sites;
- understanding geosynthetic clay liners (GCLs) containing polymer-enhanced bentonite for containment of high ionic strength and extreme pH wastes;
- large-strain consolidation of saturated tailings
- engineering filtered tailings stacks;
- closure of existing soft tailings (& energy waste) storage facilities;
- using biopolymers to reduce seepage losses from earthen canals (in collaboration with colleagues in hydraulic engineering); and
- remote sensing of soil moisture and soil strength (in collaboration with colleagues in hydrologic engineering).

Honours and Awards

- Geosynthetics International Best Paper Award for 2018
- Faculty Award for Excellence in Teaching, Department of Civil & Environmental Engineering, CSU, 2018
- ASTM International Emerging Professional (EP), 2018
- Outstanding Article on the Practice of Geotechnical Testing, Geotechnical Testing Journal, 2010

Selected Papers

Selected Publications

Pauley, M., Niemann, J., Scalia, J., Green, T., Erskine, R., Jones, A., and Grazaitis, P. (2020). Enhanced Hydrologic Simulation May Not Improve Downscaled Soil Moisture Patterns without Improved Soil Characterization. *Soil Science Society of America J.*, DOI: 10.1002/SAJ2.20052.

Stock, C., Gorakhki, M., Bareither, C., and Scalia, J. (2020). Hydraulic comparison of prescriptive and water balance covers. *J. of Environmental Engineering*, DOI: 10.1061/(ASCE)EE.1943-7870.0001733.

Bareither, C., Benson, C., Cook, E., and Scalia, J. (2020). Hydro-mechanical behavior of municipal solid waste and high-moisture waste mixtures. *Waste Management*, DOI: 10.1016/J.WASMAN.2020.02.030.

Fritz, C., Scalia, J., Shackelford, C., and Malusis, M. (2020). Determining maximum chemico-osmotic pressure difference across clay membranes. *J. of Geotechnical and Geoenvironmental Engineering*, DOI: 10.1061/(ASCE)GT.4943-5606.0002196.

Tian, Z., Bareither, C., and Scalia, J. (2020). Development and assessment of a seepage-induced consolidation test apparatus. *Geotechnical Testing J.*, DOI: 10.1520/GTJ20180375.

Herweynen, W., Bareither, C., and Scalia, J. (2019). Shear strength of coal combustion product by vane shear. *Coal Combustion and Gasification Products*. DOI: 10.4177/CCGP-D-19-00001.1.

Scalia, J., Benson, C., and Finnegan, M. (2019). Alternative procedures for swell index testing of granular bentonite from GCLs. *Geotechnical Testing J.*, 42(5). DOI: 10.1520/GTJ20180075.

Scalia, J., Bohnhoff, G., Shackelford, C., Benson, C., Sample-Lord, K., Malusis, M., and Likos, W. (2018). Enhanced bentonites for containment of inorganic wastes by GCLs. *Geosynthetics International*, DOI: 10.1680/jgein.18.00024. Selected Best Paper in *Geosynthetics International* for 2018.

Ghazi Zadeh, S., Bareither, C., Scalia, J., and Shackelford, C. (2018). Synthetic mining solutions for laboratory testing of geosynthetic clay liners. *J. of Geotechnical and Geoenvironmental Engineering*, DOI: 10.1061/(ASCE)GT.1943-5606.0001953.

Malusis, M., Scalia, J., Norris, A., and Shackelford, C. (20XX). Effect of chemico-osmosis on solute transport in clay barriers. *Environmental Geotechnics*, DOI: 10.1680/jenge.17.00109.

Scalia, J., Bareither, C., and Shackelford, C. (2018). Advancing the use of geosynthetic clay liners as barriers. *Geotechnical Engineering J. of the SEAGS & AGSSEA*, Vol. 49(4).

Scalia, J., Benson, C., Albright, W., Smith, B., and Wang, X. (2017). Properties of barrier components in a composite cover after 14 years of service and differential settlement. *J. of Geotechnical and Geoenvironmental Engineering*, DOI: 10.1061/(ASCE)GT.1943-5606.0001744.

Scalia, J., and Benson, C. H. (2017). Polymer fouling and hydraulic conductivity of mixtures of sodium bentonite and a bentonite-polymer composite. *J. of Geotechnical and Geoenvironmental Engineering*, DOI: 10.1061/(ASCE)GT.1943-5606.0001628.

Scalia, J., Benson, C., Bohnhoff, G., Edil, T., and Shackelford, C. (2014). Long-term hydraulic Conductivity of a bentonite-polymer composite permeated with aggressive inorganic solutions. *J. of Geotechnical and Geoenvironmental Engineering*, 140(3), 04013025.

Bradshaw, S., Benson, C., and Scalia, J. (2013). Cation exchange during subgrade hydration and effect on hydraulic conductivity of GCLs. *J. of Geotechnical and Geoenvironmental Engineering*, 139(4), 526-538.

Scalia, J. and Benson, C. (2011). Hydraulic conductivity of GCLs exhumed from landfill final covers with composite barriers. *J. of Geotechnical and Geoenvironmental Engineering*, 137(1), 1-13.

Scalia, J. and Benson, C. (2010). Preferential flow in GCLs exhumed from final covers with composite barriers. *Canadian Geotechnical J.*, 47, 1101-1111.

Scalia, J. and Benson, C. (2010). Effect of permeant water on the hydraulic conductivity of exhumed GCLs. *Geotechnical Testing J.*, 33(3), 1-11.

Benson, C., Kucukkira, E., and Scalia, J. (2010). Properties of geosynthetics exhumed from a final cover at a solid waste landfill. *Geotextiles and Geomembranes*, 28, 546-556.

Recent Theses

Katherine Sitler, M.S. thesis: IDENTIFICATION AND VALIDATION OF REMOTELY OPERATED SCREENING METHODS FOR ASSESSMENT OF EMBEDDED OIL (I.E., LNAPL) IN SEDIMENTS.

Wesley Hogan, M.S. thesis: IOT MONITORING OF THE OXIDATION REDUCTION POTENTIAL OF OLEOPHILIC BIO-BARRERS.

Anthony Keene, M.S. thesis: ESTIMATING INTERSTITIAL DISCHARGE AND VELOCITY IN FLOW IN RIPRAP AND GABION ENGINEERING APPLICATIONS.

Matthew Pauley, M.S. thesis: MODELING AND FIELD EVALUATION OF THE STRENGTH OF SURFACE SOILS FOR VEHICLE MOBILITY.

Wesley Herweynen, M.S. thesis: SHEAR STRENGTH OF COAL COMBUSTION PRODUCTS USING THE VANE SHEAR TEST.

Monika Popang, M.S. thesis: SELECTED FACTORS AFFECTING MEASUREMENT OF THE HYDRAULIC CONDUCTIVITY OF GEOSYNTHETIC CLAY LINERS (GCLS)

Cameron Fritz: M.S. thesis: LIMITING CLAY MEMBRANE BEHAVIOR IN WASTE CONTAINMENT.