

**ROBERT C. BACHUS**

**geotechnical engineering  
waste management  
geosynthetics**

## **EDUCATION**

Stanford University: Ph.D., Geotechnical Engineering, 1982  
University of Illinois at Chicago Circle: M.S., Civil Engineering, 1975  
University of Illinois at Chicago Circle: B.S., Civil Engineering, 1974

## **PROFESSIONAL REGISTRATION**

Georgia Professional Engineer, PE029199                      Arkansas Professional Engineer, No. 12271  
Mississippi Professional Engineer, No. 17176              Pennsylvania Professional Engineer No. 074678  
Tennessee Professional Engineer, No. 113195

## **PROFESSIONAL HISTORY**

Geosyntec Consultants, Atlanta, Georgia; Principal, 1994 - date; Associate, 1992 - 1994; Senior Project Manager, 1990 - 1992  
Georgia Institute of Technology, Atlanta, Georgia, Assistant Professor of Civil Engineering, 1983 - 1990, Instructor, 1979 - 1983  
Engineering Consulting Services provided to Soil Foundation Systems (Santa Clara, California), 1976 - 1979; Chattahoochee Geotechnical Consultants (Norcross, Georgia), 1979 - 1983.

## **REPRESENTATIVE EXPERIENCE**

### **Geotechnical Engineering**

Dr. Bachus has been the project manager and has provided technical oversight for a wide range of projects requiring geotechnical investigation, site characterization, specialty geotechnical analysis, geotechnical instrumentation, and geotechnical testing. He has more than 30 years experience in geotechnical engineering, much of this related to the analysis of earth retention structures, site characterization, and soil property evaluation for a wide range of private and public-sector clients. He has extensive experience within the electric power generation and transportation industries. Notable projects include the subsurface investigation, in-situ and laboratory testing, and slope stability analysis for dredge material contaminant dikes in Savannah, Georgia and Wilmington, Delaware and the technical oversight for the slope stability and performance assessment of compacted earth dams throughout Georgia, and in Alabama and North Dakota. Dr. Bachus has conducted and provided senior oversight and technical review for numerous static and seismic slope stability analysis and designs across the country and is currently working on the investigation, instrumentation, and rehabilitation of large landslides in Pittsburgh, Pennsylvania and a fly ash dike failure in Harriman, Tennessee. He recently provided senior review for annual dam inspections at fly ash retention embankments throughout the Midwestern U.S. for the American Electric Power (AEP) Company. He also participated on the forensic investigation team studying the failure of a large fly ash containment dike sited on a karst foundation in North Georgia and has investigated the cause and rehabilitation of Georgia Highway 53 after it was adversely impacted by the sinkhole activity that was activated by nearby mining activities. His experience includes foundation and waste settlement evaluation, soil liner material evaluation, and laboratory testing for the Department of Energy (DOE) Fernald Environmental Management Project (FEMP) in Fernald, Ohio and worked on the geotechnical site characterization for the DOE's Savannah

River Site in Aiken, SC. He has worked on the assessment of the hydraulic performance of low permeability compacted clay liners at several sites across the US, including the hazardous waste disposal site in Adams County, Colorado. Dr. Bachus has worked extensively in the area of soft soil engineering, including slope stability assessment and settlement. He is currently working on an assessment of the failure and reconstruction of an anchored bulkhead adjacent to the Port of Savannah. He directed the innovative slope stability assessment and erosion protection of a riverbank embankment subject to undermining erosion in Oklahoma City, Oklahoma and adjacent to a fly ash pond in Macon, Georgia.

Dr. Bachus has also worked on residential, commercial, and industrial development projects where foundation problems developed. Specific projects included a forensic investigation in a housing development where excessive structural distress developed and gas migration occurred soon after construction was completed and design of underpinning and excavation protocols for structural foundations at an industrial development constructed over decomposing organic materials.

He is nationally-recognized for his expertise in the areas of in situ testing, laboratory testing, site characterization, soil stabilization, instrumentation, and data management and visualization. He was responsible for technical oversight of GeoSyntec's Geomechanics and Environmental Laboratory and the Soil-Geosynthetics Interaction Laboratory in Atlanta, Georgia. The laboratories specialized in conventional and specialized geotechnical testing, soil/geosynthetic interaction testing, and geo-environmental testing. Dr. Bachus has devoted a considerable effort in developing and utilizing in situ testing equipment and analytical techniques for interpreting in situ test results. These efforts have largely been directed towards the self-boring and pre-bored pressuremeter, but also include the piezoelectric cone penetrometer and the flat plate dilatometer. For the past 20 years, Dr. Bachus has worked extensively in the site characterization of sites underlain by soft soils, loose sands, stiff glacial till, and karst. He worked extensively on the geotechnical investigation for a Salt Waste Processing Facility at the Department of Energy (DOE) Savannah River Site in Aiken, South Carolina, where it is critical to assess the engineering characteristics of a soft soil layer attributed to the weathering a limestone at a depth of nearly 100 feet. He has worked with the Federal Aviation Administration (FAA) regarding a guidance tower in northwestern Florida whose stability had been compromised by the karst foundation conditions and well as anchored towers in North Carolina and self-supporting towers in Florida damaged by recent hurricanes. He recently provided independent review of a large scale load test of the London Avenue Canal in New Orleans, on behalf of the U.S. Army Corps of Engineers (USACE) and worked with the New Orleans Levee District and USACE on assessing performance of the repaired portion of the levee along the 17<sup>th</sup> Street Canal. He is currently working as a member of the review team to evaluate the safe water elevation of the London Avenue, 17<sup>th</sup> Street, and Orleans Canals in New Orleans.

For the past five years, he has been extensively involved in the development and implementation of geotechnical data management systems, starting with an innovative project for the Maryland State Highway Administration (MSHA) regarding the Woodrow Wilson Bridge reconstruction and currently with the Federal Highway Administration (FHWA) regarding the development of standardized geotechnical management systems by highway agencies across the U.S. He has developed data management and visualization strategies for geotechnical projects on behalf of the Georgia Department of Transportation (GDOT) and has developed workshops for the transportation industry related to geotechnical data management practices. He is currently working as part of the instrumentation and information management team to develop an Underground Construction Information Management System for the Crossrail project in London, UK, where the focus is not only on instrumentation, but innovative techniques for data visualization.

Dr. Bachus taught in the geotechnical engineering program for eleven years at the Georgia Institute of Technology. He was primarily responsible for teaching graduate courses dealing with the engineering

properties and physico-chemical properties of soils, clay mineralogy, and field testing techniques, seepage and slope stability, rock mechanics, soil construction, and soil/site improvement techniques in addition to undergraduate courses in soil mechanics and foundation engineering. One of his notable research projects was in collaboration with Southern Company Services in the southeastern US and the Electric Power Research Institute (EPRI) regarding the beneficial reuse of coal combustion by-product (CCB) materials. This project included three full-scale highway construction projects focused on the use of CCBs. He was recognized with four outstanding teaching awards from the American Society of Civil Engineers (ASCE) Student Chapter and a similar award from the Student Government Association. Dr. Bachus organized and prepared lectures for several continuing education short courses, technical seminars, and invited lectures. He currently teaches university extension courses for the University of Florida and the University of Wisconsin on the design, testing, and performance of low permeability clay liners and slope stability analysis techniques. He has prepared and delivered a course on behalf of the Tennessee Valley Authority (TVA) related to seepage and drainage design methodologies. Dr. Bachus has authored or co-authored more than 50 technical papers and reports. He was co-editor of the ASTM publication STP 1084, *Deep Foundation Improvements: Design, Construction and Testing*. He recently co-authored several state-of-the-practice design guidelines titled *Geotechnical Engineering Circulars* under contract to the FHWA and is currently a certified lead instructor for the FHWA-sponsored *Soils and Foundations Workshop* and a certified instructor for the FHWA workshop titled *LRFD for Highway Bridge Substructures and Earth Retaining Structures*.

### **Waste Management**

For the past 18 years, Dr. Bachus has worked on the siting, design, permitting, construction and closure of municipal and hazardous waste landfills throughout the United States. He has led the permitting and design efforts for waste facilities in Georgia, Indiana, Florida, Tennessee, Arkansas, Mississippi, and Illinois, and has participated on and provided senior technical oversight for landfill projects in Pennsylvania, New York, California, Ohio, Lisboa, Portugal, and Salinas, Puerto Rico. His work includes specialized analyses for waste facilities constructed in areas underlain by karst geologic features, construction over soft foundations, design of landfill bioreactors, and innovative concepts for vertical expansion over solid waste, including the use of mechanically stabilized earth retaining structures to enhance landfill capacity. The results of these analyses have been used to assess the impact on the performance of composite-lined landfills. Dr. Bachus has been invited to meet with state regulatory agency personnel across the country and present these design and analysis methodologies and technical approaches. He currently is a member of the Technical Advisory Group (TAG) for the Florida Department of Environmental Protection (FDEP) and is providing guidance to the agency regarding the development of specific investigation and design guidelines for landfill construction in karst terrain.

Dr. Bachus has extensive experience in the subsurface investigation and geotechnical analysis and design for a wide range of geological settings, including soft foundation conditions and in karst areas. The soft foundation activities include soft soils and industrial by-product materials. With regards to industrial by-products, Dr. Bachus has been involved for more than 25 years on characterization, testing, design, construction, basin closure, and beneficial reuse projects involving coal combustion by-products, rock quarry pond screenings, kaolin mine spoils, ammonia soda ash, and sludges from drilling muds and from rayon fiber production. His work in karst areas has included hydrogeologic studies regarding preferential pathways for ground-water and gas migration, engineering solutions to permit construction over karst features, and assessment of sinkhole hazards related to land development restrictions. This work involved large projects in Georgia, Alabama, Tennessee, and Florida. Most notable are projects in northwest Georgia related to the siting of ash and gypsum disposal ponds, a gypsum disposal facility located in karst and a closed CERCLA site in Idaho containing soluble gypsum, and six sites located across Tennessee for the development of municipal solid waste disposal facilities. His expertise related to karst characterization and development was recognized recently by the invitation to deliver the keynote lecture

at the 10<sup>th</sup> International Karst Conference, in 2005. Dr. Bachus has directed the design of several landfill gas recovery systems which included site redevelopment and the beneficial end use of the collected gas. He co-authored a design guidance manual related to the leachate distribution and gas collection in bioreactor landfills. He has worked on the design of leachate treatment systems at sites characterized by abnormally high levels of ammonia in the leachate. He has taught university extension courses related to landfill design for the past 15 years and recently taught a course regarding the slope stability assessment at solid waste facilities and on the design and operation of landfill gas and leachate recovery systems.

Dr. Bachus has conducted analyses for the vertical and lateral expansions of solid waste landfills, the design of cover systems for steep sideslopes, and the forensic assessment of landfill slope failures. Regarding this latter topic, Dr. Bachus has worked on the analysis of failures at several landfills including: Hughes Road (aka Rumpke) Landfill (Ohio), Doña Juana Landfill (Bogotá, Columbia), Bierloas Landfill (Lisboa, Portugal), Chilton County Landfill (Alabama), Chastang Landfill (Alabama), Carleton Farms Landfill (Michigan), and the Vandale Superfund Site (Ohio). In addition, he has worked on numerous failure assessments regarding cover system instability at numerous facilities across the country. He has been working on the design of final cover systems which support beneficial end-use plans and innovative leachate recirculation and gas recovery plans. He has been active in the design, operation, and compliance monitoring of landfill gas collection and control systems. Dr. Bachus' activities includes work for both private and public sector clients, including Browning-Ferris Industries; Allied Waste, Waste Management; Chambers Development Company; USA Waste Services; Metro Dade County, Florida; Town of Babylon, New York and Town of Huntington, New York. Dr. Bachus has also worked on several remediation design projects, primarily on aspects related to low-pH and chromium impacted sites, slurry wall containment, and soil/waste stabilization and compatibility testing. He is currently providing oversight and guidance for RCRA Facility Investigations (RFIs) and Corrective Measures Studies (CMSs) for NASA at the Kennedy Space Center, Florida.

### **Geosynthetics**

Dr. Bachus was responsible for technical oversight of GeoSyntec Consultants' Materials Testing Laboratory (MTL) in Boca Raton, Florida. This laboratory was the preeminent geosynthetics testing geosynthetic laboratory in the United States for nearly 15 years, providing comprehensive geosynthetic testing. Dr. Bachus has overseen large testing programs at the MTL for evaluating the compatibility of geosynthetic liner system components in contact with leachate from DOE's LLRW site in Fernald, Ohio, and the U.S. Army's Rocky Mountain Arsenal site in Commerce City, Colorado.

For the past 17 years, Dr. Bachus has been active in design projects using geosynthetic and in research projects focused on geosynthetic product development and innovative use of geosynthetics. This research focused on construction survivability of geotextiles, compression creep performance of drainage composites, effects of boundary conditions on geocomposite transmissivity, hydraulic conductivity ratio testing of geotextiles, performance of reinforced soils at high strain rates, stabilization of embankments constructed over soft subgrades, hydraulic and chemical transmission measurements through geomembranes, clogging and blinding characteristics of geotextiles, and strength and compatibility testing of geosynthetic clay liners.

Dr. Bachus has also been an instructor for the Federal Highway Administration (FHWA)-sponsored course on design using geosynthetics and has co-authored design guidance documents focusing on filtration design using geotextiles and drainage design of composite drainage systems, including *The GSE Drainage Design Manual*, which was received International Geosynthetics Society (IGS) Award at the 8th International Conference on Geosynthetics in Yokohama, Japan in 2006.

## **AFFILIATIONS**

International Geotextile Society

North American Geosynthetics Society

American Society for Testing and Materials

American Society of Civil Engineers

International Society of Soil Mechanics and Foundation Engineering

Transportation Research Board (Soil Properties Committee and Instrumentation Committee)

Technical Affiliate, Association of Drilled Shaft Contractors

Technical Affiliate, Pile Driving Contractors Association (Education Committee)

United States Society on Dams – Materials for Embankment Dams Committee

## LIST OF PUBLICATIONS

- 75-1 Silver, M.L., Priemer, R., and Bachus, R.C., "*Noise Assessment of the Chicago Transit Authority Rail Rapid Transit System*", Report UMTA-IL-11-007-2, Dept. of Transportation, Urban Mass Transit Authority, Jul 1975.
- 75-2 Bachus, R.C., "*Review of Filter Design Criteria for Clay*", Stanford University Research Report submitted to Dr. J.L. Sherard, Dec 1975.
- 76-1 Clough, G.W. and Bachus, R.C., "*An Evaluation of the Technical Feasibility of a Slurry Trench Cut-Off for the Excavation for the Tensas-Cocodrie Pumping Plant and Review of Slurry Trench Specifications*", report submitted to Vicksburg district, U.S. Army Corps of Engineers, 1976.
- 78-1 Clough, G.W. and Bachus, R.C., "*Self-Boring Pressuremeter Testing of San Francisco Bay Mud for Muni Track Extension*", report submitted to Woodward-Clyde Consultants, San Francisco, Sep 1978.
- 79-1 Clough, G.W. and Bachus, R.C., "*Self-Boring Pressuremeter Testing of Hudson River Soils for the Westside Highway Project, New York City*", report submitted to DOT, State of New York, Albany, Aug 1979.
- 80-1 Sitar, N., Bachus, R.C., and Clough, G.W., "*Behavior of Weakly Cemented Soil Slopes under Static and Seismic Loading Conditions*", Report No. 44, The John A. Blume Earthquake Engineering Center, Stanford University, June 1980.
- 81-1 Bachus, R.C., Clough, G.W., Sitar, N., Shafii-Rad, N., "*Cemented Sands under Static Loading*", Journal of the Geotechnical Engineering Division, ASCE, Vol. 107, No. GT6, Jun 1981.
- 81-2 Bachus, R.C., Clough, G.W., Sitar, N., Shafii-Rad, N., Crosby, J., and Kaboli, P., "*Behavior of Weakly Cemented Soil Slopes under Static and Seismic Loading Conditions*", Vol. II, John A. Blume Earthquake Engineering Center report, Stanford University, Jul 1981.
- 82-1 Clough, G.W. and Bachus, R.C., "*An Investigation of Sampling Disturbance in Weakly Cemented Sand*", Engineering Foundation Conference on Updating Subsurface Sampling and In-Situ Testing, Santa Barbara, CA, Jan 1982.
- 82-2 Bachus, R.C. and Mitchell, J.K., "*In-Situ Soil Testing - Part A - Session Reporters Summary*", Engineering Foundation Conference on Updating Subsurface Sampling and In-Situ Testing, Santa Barbara, CA, Jan 1982.
- 82-3 Barksdale, R.D., Bachus, R.C., and Calnan, M.B., "*Settlements of a Tower on Residual Soil*", Proceedings, ASCE Specialty Conference on Engineering and Construction in Tropical Residual Soils, Honolulu, HI, Jan 1982.
- 83-1 Barksdale, R.D. and Bachus, R.C., "*Design and Construction of Stone Columns*", Report No. FHWA/RD-83/026, Dec 1983.
- 84-1 Pohland, F.G. and Bachus, R.C., "*Critical Review and Summary of Leachate and Gas Production from Landfills*", Final Report to U.S. Environmental Protection Agency, Cooperative Agreement No. CR809997, Municipal Environmental Research Laboratory, Cincinnati, OH, Mar 1984.
- 84-2 Bachus, R.C. and Barksdale, R.D., "*Vertical and Lateral Behavior of Model Stone Columns*", Proceedings, International Conference on In-Situ Soil and Rock Reinforcement, Paris, Oct 1984.
- 85-1 Pohland, F.G. and Bachus, R.C., "*Critical Review and Summary of Analytical Methods for the Determination of the Hydraulic Integrity of Synthetic Liners*", Final Report, Cooperative Agreement No. CR810807, U.S. Environmental Protection Agency, Hazardous Waste Research Laboratory, Cincinnati, OH, Apr 1985.

- 85-2 Bachus, R.C., "*The Effects of Sample Disturbance on the Stress-Deformation Behavior of Soft Sandstone*", Proceedings, 36th Annual Highway Geology Symposium, Clarksville, IN, May 1985.
- 85-3 Bachus, R.C., "*The Use of the Pressuremeter to Evaluate the Strength-Deformation Characteristics of Soft Rocks*", Proceedings, 26th U.S. Symposium on Rock Mechanics, Rapid City, SD, Jun 1985.
- 85-4 Bachus, R.C., "*In-Situ Testing to Evaluate the Deformation Characteristics of Residual Soils*", Invited Discussion, In-Situ Testing Techniques Session Report, XI International Conference on Soil Mechanics and Foundation Engineering, San Francisco, CA, Aug 1985.
- 86-1 Hughes, J.M.O. and Bachus, R.C., "*Feasibility of the Development of an Instrument to Measure the In-Situ Stress and pore Pressure in Soils Below 6000 Meters in Depth*", Summary Research Report Submitted to The Canadian Geotechnical Survey, May 1986.
- 86-2 Bachus, R.C., Hughes, J.M.O., Benoit, J., and Deshpande, S.C., "*The Pressuremeter: An In-situ Testing Instrument Which Provides Useful Data for Geotechnical Design*", prepared for "How-To" Session on Pressuremeter Testing, ASCE Specialty Conference, Use of In-situ Tests in Geotechnical Engineering, VPI, Jun 1986.
- 86-3 Bachus, R.C., "*The Pressuremeter Test and Its Role in Evaluating the Engineering Behavior of Soft Rock*", 8th Danube-European Conference on Soil Mechanics and Foundation Engineering, Nürnberg, Federal Republic of Germany, Sep 1986.
- 87-1 Bachus, R.C., Benoit, J., and Hughes, J.M.O., "*The Use of In-Situ Soil Tests To Evaluate the Engineering Properties of Stiff Soils*", 65th Transportation Research Board Annual Meeting, Session on Properties of Overconsolidated and Stiff Clay Soils and Shales, Jan 1987.
- 87-2 Bachus, R.C., "*Lesson Learned from European Practice on the Use of Stone Columns for Site Improvement*", 38th Annual Highway Geology Symposium, Pittsburgh, PA, May 1987.
- 87-3 Bachus, R.C., Benoit, J., and Hughes, J.M.O., "*The Role of Pressuremeter Testing in Geotechnical Exploration Programs*", Journal of The Boston Society of Civil Engineers, Jun 1987.
- 87-4 Collins, S. and Bachus, R.C., "*The Use of Hypoelasticity to Model the Behavior of Sands*", International-Workshop on Constitutive Equations for Granular Non-Cohesive Soils, Case Western Reserve University, Jul 1987.
- 87-5 Bachus, R.C., "*Earth Reinforcement: Backfill Interaction and Behavior*", Southeastern Transportation and Geotechnical Engineering Conference, Hot Springs, AK, Oct 1987.
- 88-1 Bachus, R.C., "*Large Scale Pullout Resistance of Geogrid Reinforcement*", 66th Annual Meeting of the Transportation Research Board, Session on Effects of Geosynthetics on Soil Properties, Jan 1988.
- 88-2 Mayne, P. and Bachus, R.C., "*Profiling OCR in Clays by Piezocone Soundings*", 1st International Symposium on Penetration Testing (ISOPT1), Mar 1988.
- 88-3 Briaud, J.L. and Bachus, R.C., "*Full Displacement and Driven Pressuremeter Testing of Soils*", Specialty Session, 1st International Symposium on Penetration Testing (ISOPT1), Mar 1988.
- 88-4 Bachus, R.C. and Ospina, R., "*Pullout Resistance of the Georgia Stabilized Earth Mesh Embedded in Compacted Sand*", Georgia Department of Transportation, Office of Materials and Research, Aug 1988.
- 88-5 Bachus, R.C. and Deh-Jang, D., "*Evaluation of the Long Term Compression Creep Response of Geocomposite Drainage Cores*", Research Report submitted to Monsanto Chemical Company, Aug 1988.

- 88-6 Bachus, R.C. and Larrimore, C.L., "*Ash Utilization in Highway Construction-Georgia Demonstration Project*", EPRI Report, Oct 1988.
- 89-1 Bachus, R.C., "*Radiographic Monitoring of Laboratory Scale Model Tests: Its Role in the Interpretation of Geotechnical Test Results with Emphasis on the Advanced Study of the Pressuremeter*", Final Project report submitted to NSF, Mar 1989.
- 89-2 Bachus, R.C. and Larrimore, C.L., "*Ash Field Demonstration Project - Mississippi*", Research report submitted to Southern Company Services, Inc., Research and Development Department, May 1989.
- 89-3 Bachus, R.C. and Barksdale, R.D., "*Design Methodology for Foundations on Stone Columns*", 1989 Foundation Engineering Congress, Northwestern University, Jun 1989.
- 89-4 Mayne, P.W. and Bachus, R.C., "*Penetration Pore Pressures by CPTU, DMT and SBP*", Proceedings, 12th ICSMFE, Rio de Janeiro, Aug 1989.
- 89-5 Bachus, R.C., "*Use of Coal Ash in Florida Highway Construction*", Research Report submitted to Southern Company Services, Inc., Florida DOT and Gulf Power Company, Aug 1989.
- 89-6 Bachus, R.C. and Gallup, R.A., "*Hydraulic Performance of Geocomposite Drainage Products*", Research Report submitted to Contech Construction Products, Sep 1989.
- 89-7 Bachus, R.C., "*Physical and Engineering Properties of Coal Ash*", Design and Construction Applications Using Ash: A Technical Workshop, Atlanta, Georgia, Nov 1989.
- 89-8 Bachus, R.C., "*Soil Amendment and Subgrade Stabilization*", Design and Construction Application Using Ash: A Technical Workshop, Atlanta, Georgia, Nov 1989.
- 90-1 Bachus, R.C., "*Use of Plant Daniel Fly Ash as Mineral Filler in Asphalt Concrete*", Research Report submitted to Southern Company Services, Mar 1990.
- 90-2 Bachus, R.C. and Yalaza, D., "*Development of Design Methodology for Mechanically Stabilized Earth Walls*", Research Report submitted to Beazer West, Aug 1990.
- 90-3 Bachus, R.C., "*Deep Foundation Improvement Techniques-Current State of Practice*", Chairman's Report, ASTM Special Technical Publication STP 1084, Sep 1990.
- 90-4 Bachus, R.C., "*Behavior of Drilled Shaft Foundations in Residual Soil Partially Weathered Rock*", Workshop on Drilled Shaft Foundations, Association of Drilled Shaft Contractors, Atlanta, GA, Sep 1990.
- 90-5 Bachus, R.C., Stone, R.C. and Fiest, P.W., "*Performance of Drilled Shaft Foundation for LLWAS Structures*", Research Report submitted to Federal Aviation Administration, Southern Region, Oct 1990.
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- 91-2 Bachus, R.C. and Larrimore, C.L., "*Use of Coal Ash in Highway Construction*", International Symposium in Ash Utilization, Shanghai, China, Mar 1991.
- 91-3 Bachus, R.C. and Larrimore, C.L., "*Index System as a Means of Coal Ash Classification*", International Symposium on Ash Utilization, Shanghai, China, Mar 1991.



- 91-4 Bachus, R.C., "*Use of High Volume Fly Ash Concrete - An Industry Survey*", Workshop on High Volume Fly Ash Concrete, Southern Company Services, Atlanta, GA, May 1991.
- 91-5 Bachus, R.C. and Larrimore, C.L., "*Development of Coal Ash Index System for Bottom Ash*", ASCE Power Engineering Division Specialty Conference, Aug 1991.
- 91-6 Swan, R.H., Jr., Bonaparte, R., Bachus, R.C., Rivette, C.A., and Spikula, D.R., "Effect of Soil Compaction Conditions on Geomembrane-Soil Interface Strength", *Geotextiles and Geomembranes*, Vol. 10, 1991, pp. 523-529.
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- 92-2 Bachus, R.C. and Swan, R.H., "*Shear Strength of Geosynthetic Clay Liners*", presented at Geosynthetic Clay Liner Roundtable Discussion, Browning-Ferris Industries, Memphis, TN, Sep 1992.
- 93-1 Bachus, R.C., Reid, R.A., Olen, K.L., and Fragaszy, R., "Response of Geogrid-Reinforced Soil Subjected to Blast Loading", *Proceedings of the 6th International Symposium on Interaction of Nonnuclear Munitions with Structures*, Panama City, FL, May 1993.
- 93-2 Bachus, R.C., Soderman, K.L., and Swan, R.H., "*Factors which Affect Soil/Geosynthetic and Geosynthetic/Geosynthetic Interface Shear Strength for Materials Used in Landfill Lining Systems*", American Society of Civil Engineers, 1993 Annual Meeting, Naples, FL, Oct 1993.
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- 96-1 Swan, Jr., R.H., Yuan, Z., and Bachus, R.C., "*Factors Influencing Laboratory Measurement of the Internal and Interface Shear Strength of GCLs*", presented at the American Society for Testing and Materials Symposium on Testing and Acceptance Criteria for Geosynthetic Clay Liners, Atlanta, GA, 1996.
- 97-1 Yuan, Z., Swan, Jr., R.H., and Bachus, R.C., "Pullout Response of Geogrids Subjected to Impact Loading", *Proceedings of the International Symposium on Mechanically Stabilized Backfill*, Jonathan T.H. Wu, Ed., Reinforced Soil Research Center, University of Colorado at Denver, Colorado, 1997, pp. 295-306.
- 98-1 Elias, V., Yuan, Z., Swan, Jr., R.H., and Bachus, R.C., "*Development of Protocols for Confined Extension/Creep Testing of Geosynthetics for Highway Applications*", Report No. FHWA-RD-97-143, 1998.
- 98-2 Yuan, Z., Swan, Jr., R.H., Bachus, R.C., and Elias, V., "Soil Confinement Effect on Stress-Strain Properties of Geosynthetics", *Proceedings, Sixth International Conference on Geosynthetics*, Vol. 2, Atlanta, Georgia, 1998, pp. 523-528.
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- 02-1 Bachus, R.C., Zettler, T.E., Rabun, J.J., and Bailey, W., Use Of PDAs To Record Geotechnical Boring Logs In The Field, Southeast Geotechnical Engineering Conference, STAGE, 2002.
- 03-1 Bachus, R.C., Phillips, J., and S. Simmons, S.L., "Use Of GIS Techniques To Assist In The Stability Assessment Of Dredged Materials Containment Dams," Dam Safety Conference, 2003.
- 03-2 Bachus, R.C., "Design Guidance for Landfill Bioreactors," Second International Landfill Research Symposium, Asheville, North Carolina, 2003.
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- 03-4 Bachus, R.C., Jaber, J., and Harris, J., Design Methodology for Bioreactor Landfills, RCRA Conference, 2003.
- 04-1 Bachus, R.C., Houlihan, M.F., Kavazanjian, E., Isenberg, R., and Beech, J.F., "Bioreactor Landfill Stability: Key Considerations", MSW Management Magazine, Sept/Oct., 2004.
- 05-1 Bachus, R.C., "Geotechnical Analysis in Karst: The Interaction Between Engineers and Hydrogeologists," Keynote Lecturer, *Sinkholes and the Engineering and Environmental Impact of Karst*, ASCE, Geotechnical Special Publication No. 144, San Antonio, Texas, 2005. pp 3-9.
- 06-1 Bachus, R.C., Zettler, T.E., and Fleming, J.E., "Use of a Settlement Profiler to Assess Waste Compressibility", GeoCongress'06, ASCE, Atlanta, March, 2006. .
- 07-1 Bachus, R.C., Hebel, T.E., Mazanti, B.B., and Fleming, J.F., "Settlement Profiling Instrumentation System to Assess Waste Compressibility," Proceedings of the 7<sup>th</sup> International Symposium on Field Measurements in Geomechanics, ASCE Geotechnical Special Publication 175, Boston, Massachusetts, 2007
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