William A. Aden, P.E.
President and CEO

Summary of Professional Experience

- 33 years consulting engineering, design and management experience
- Founding partner of Draper Aden Associates, Inc., with Joseph C. Draper, L.S., in 1972
- Currently President and Chief Executive Officer of the Firm

- As Chief Executive Officer of Draper Aden Associates, Mr. Aden is ultimately responsible for the operation of the firm's offices in Blacksburg, Charlottesville, Hampton Roads, and Richmond, Virginia.

- Mr. Aden has 33 years of experience as a practicing Professional Engineer and as a professional in engineering management. This experience includes a variety of engineering studies and design projects, with particular emphasis on water supply, wastewater, water resources, environmental, and various infrastructure projects.

- Mr. Aden is frequently called upon to provide advisory services dealing with infrastructure issues in the General Assembly in the state of Virginia. Additionally, he has provided downlink TV classes under the sponsorship of Virginia Tech and the Virginia Department of Health on issues having to do with water and sewer rates. He serves as a direct liaison with Washington County, the Town of Pulaski and Pulaski County on engineering matters before these bodies.

Education

- B.S./1968/Civil Engineering/Virginia Tech
- M.S./1972/Environmental Engineering/Virginia Tech
- Ph.D./Course work completed/Virginia Tech

Professional Registration(s)

- Professional Engineer/1972/Virginia
- Professional Engineer/1975/West Virginia
- Professional Engineer/1977/Tennessee
- Professional Engineer/1978/North Carolina
- Professional Engineer/1981/Florida
- Professional Engineer/1992/Alabama

Representative Project Experience

Mr. Aden has served as Managing Principal for the following representative projects:

- **Washington County Service Authority, Washington County, VA.** Consultant for the past 23 years to the Authority, which delivers water and sewer to over 18,000 customers. He has been actively engaged in design and management consulting for the Authority involving hydraulic modeling, water line design, leak detection, pumping station design, water storage tank design, wastewater collection and treatment, rate design for both water and sewer, and design of natural gas lines. Additionally, he has provided budgeting assistance; determined financing alternatives for project improvements; and provided assistance in grant applications for a $3.5 million Virginia Resources Authority revenue bond issue.
- **New Century Commerce Park, Pulaski County, VA:** Member of the Advisory Board for the planning of an approximate 2000-acre multi-jurisdictional commerce park in Pulaski County, the largest economic development project in the New River Valley. Draper Aden Associates performed an environmental assessment of the properties and conducted a feasibility study for the provision of both potable water and water for fire protection. Services also include preparation of a Preliminary Engineering Report that addressed the possible development of a new water treatment plant and contrasted that with upgrades to various existing water plants.
- **Consultant to Pulaski County** in the selection, financing and acquisition of the Pulaski County Corporate Center property, as well as the site of the Volvo White Truck facility. Conducted preliminary engineering for both sites, which consisted of a 0.5 mgd elevated water tank, major sewer interceptors, railroad spur, and grading plans. Additionally, provided individual site design for specific industries, and assisted in marketing efforts for prospective industries.

- **Water & Wastewater Appraisal and Rate Study, Roanoke County/City of Roanoke, VA.** Inventories of all of Roanoke County and the City of Roanoke water and sewer facilities, including treatment plants, water distribution and sewage collection lines, and pump station storage facilities.
- **Water and Sewer Rate Study, Bedford, VA.** Rate analysis for approximately 3,265 water and sewer customers.

Areas of Expertise

- Rate Analysis
- Financing Alternatives
- Infrastructure Evaluation
- Capital Improvement Plans
- Funding Assistance

Professional Memberships

- Currently serves as President of the Blacksburg Partnership and Economic Development Organization, which serves to attract economic development to the greater Town of Blacksburg.
- American Society of Civil Engineers
- American Water Works Association
- Professional Services Management Association
- National Society for Professional Engineers

Biographical Sketch

Name: **BARTON, Nicholas R.**

Education: University of London, King's College,1966 - BSc (Eng) Honours, in Civil Engineering.
Imperial College, London, 1971 – PhD in Rock Mechanics, on Rock Slope Stability

Previous positions:

2000-present	Principal, Nick Barton & Associates (Norway and Brazil)
2000	Senior international consultant, NGI, Oslo
1990-1999	Technical Adviser, Rock Engineering and Reservoir Mechanics Division, NGI, Oslo
1984-1989	Division Director, Dam, Rock and Avalanche Division, NGI, Oslo.
1983-1984	Manager of Geomechanics, Terra Tek Inc., Salt Lake City, Utah.
1980-1983	Senior Staff Consultant, Terra Tek Inc., Salt Lake City, Utah.
1971-1980	Senior Engineer, Dam and Rock Group, NGI, Oslo.

Awards:

- US National Committee for Rock Mechanics 1975 Research Award for paper: "Engineering Classification of Rock Masses for the Design of Tunnel Support"
- Geological Society of America 1978 Burwell Award for paper: "The Shear Strength of Rock and Rock Joints"
- 8th Laurits Bjerrum Memorial Lecture, Oslo, 1985.
- 4th Manuel Rocha Memorial Lecture, Lisbon, 1987.
- 12th Prague Geotechnical Lecture 2004
- Biographical Citations: since 1993, Who's Who in the World; since 1994, Who's Who in Science and Engineering, Marquis biannual Editions.
- Doctor Honoris Causa honorary doctor degree, University of Cordoba, Argentina, 2004.

Invited International Conference Lectures :

Keynote lectures (K), Panelist reports (P), Moderator reports (M), and General reports (G) at international symposia and congresses (see publication list): Capri 1977 (P), Berkeley 1982 (K), Lisbon 1983 (P), Montreal ISRM 1987 (M), Loen 1990 (K), Istanbul 1993 (K), (P), Tokyo ISRM 1995 (K), Sydney 1996 (K), Taipei 1996 (K), Shimla 1998 (K), Cancun NARMS 1998 (G), Santos 1998 (K), Paris ISRM 1999 (G), Singapore 2000 (K), São Paulo 2002 (K), Three Gorges China 2004 (K), Cordoba-Argentina 2004 (K), Kyoto ARMS 2004 (K).

Publications:

Author/co-author of about 215 papers in technical journals and conference proceedings. Author of book on TBM tunnelling, 2000.

Selected key publications:

1. Barton, N., Lien, R. & Lunde, J. 1974. Engineering classification of rock masses for the design of tunnel support. Rock Mechanics. 6: 4: 189-236.
2. Barton, N. 1976. The shear strength of rock and rock joints. Int. Jour. Rock Mech. Min. Sci. and Geomech. Abstr., Vol. 13, No. 9: 255-279. Also NGI Publ. 119, 1978.
3. Barton, N. & Choubey, V. 1977. The shear strength of rock joints in theory and practice. Rock Mechanics 1/2:1-54. Vienna: Springer. Also NGI Publ. 119, 1978.
4. Barton, N. & Bandis, S. 1982. Effects of block size on the shear behaviour of jointed rock. Keynote Lecture, 23rd US Symposium on Rock Mechanics, Berkeley, California.

5. Barton, N., Bandis, S. & Bakhtar, K. 1985. Strength, deformation and conductivity coupling of rock joints. Int. J. Rock Mech. & Min. Sci. & Geomech. Abstr. 22: 3: 121-140.
6. Barton, N. 1986. Deformation phenomena in jointed rock. 8th Laurits Bjerrum Memorial Lecture, Oslo. Publ. in Geotechnique, Vol. 36: 2: 147-167.
7. Barton, N. 1987. Predicting the behaviour of underground openings in rock. Manuel Rocha Memorial Lecture, Lisbon. NGI Publication 172, 1988. Also Geotecnia 53, July 1988 (in Portugese).
8. Barton, N., By, T.L., Chryssanthakis, P., Tunbridge, L., Kristiansen, J., Løset, F., Bhasin, R.K., Westerdahl, H. & Vik, G. 1994. Predicted and measured performance of the 62m span Norwegian Olympic Ice Hockey Cavern at Gjøvik. Int. J. Rock Mech, Min. Sci. & Geomech. Abstr. 31:6: 617-641. Pergamon.
9. Barton, N. 2000. TBM tunnelling in jointed and faulted rock. 173p. Balkema, Rotterdam.
10. Barton, N. 2002. Some new Q-value correlations to assist in site characterization and tunnel design. Int. J. Rock Mech. & Min. Sci. Vol. 39/2:185-216.

Professional posts:
Coordinator of ISRM Working Party "Suggested methods for the quantitative description of discontinuities in rock masses". 1974 to 1980; Adjunct Professor, Dept. of Mining, University of Utah, 1983-1984; Adjunct Professor, Dept. of Rock Mechanics, University of Luleå, 1985-1989; Visiting Professor, Sao Paulo University, 1997- 2001; ISRM Committee on Rock Joints, 1988-1992; ISRM Committee on Scale Effects in Rock Mechanics, 1988-1992; ISRM Committee on Failure Mechanisms in Underground Openings, 1988-1990.

Principal project experience:
2004 - Consultant to Odebrecht for planned trans-Andean TBM water transfer tunnel of 14km length at depths of up to 2,300m, performing empirical and contracting numerical distinct element and fracture mechanics modelling of likely rock burst and rock failure and deformation processes with in situ rock stresses of at least 60 MPa.
2003- Q-system based core characterization and joint description for four 1000m deep boreholes at SKB's Forsmark and Simpevarp candidate HLW nuclear waste repository sites in Sweden, and related surface outcrop characterization at both sites.
2001 - 2002 - Consultant to Bechtel-SAIC (BSC) on rock joint description and modelling, and for general rockmass characterization for the Yucca Mountain HLW repository, USA. Think Tank member for BSC.
2000 - Consultant to Morrisson Knudsen/TRW on characterization and design of the Yucca Mountain high level nuclear waste repository project in jointed tuff, Nevada, USA.
1997 – 1999 - Consultant to CBPO-Odebrecht on the Itá UHE, Brazil concerning stress fracturing problems in diversion and pressure tunnels caused by the exceptionally high stress in massive basalt flows.
1990-1996 -Project Manager of NGI's geotechnical consultancy to UK Nirex Ltd. The NGI project included geotechnical characterisation of some 10 km of drill cores, numerical analysis and rock engineering design of numerous caverns, and associated excavations, and planning of the *in situ* testing for the Rock Characterisation Facility at Sellafield. Member of Nirex's Site Characterisation and Advisory Group and Geotechnical Study Group.
1990-1991 - Project Manager for the 62 m span Gjøvik Olympic cavern rock mechanics design studies performed by NGI for consultants Fortifikasjon A/S in Norway.
1987-1990 - Project Manager for NGI's lab. and *in situ* joint characterisation and numerical modelling, Stripa Phase III, Site Characterisation and Validation Project 1986-1991, where he was Principal Investigator in rock mechanics.
1984-1986 - Project manager for North Sea Ekofisk chalk reservoir compaction and subsidence studies, using laboratory and numerical studies, for Norwegian Petroleum Directorate.

DENNIS A. BAZYLINSKI

A. EDUCATION AND PROFESSIONAL ACTIVITIES

Address: Department of Biochemistry, Biophysics, and Molecular Biology, 207 Science I, Iowa State University, Ames, IA 50011
Phone: 515-294-2561 FAX: 515-294-6019 Email: dbazylin@iastate.edu

EDUCATION:
B.S., Biology, Northeastern University, 1976
M.S., Biology, Northeastern University, 1980
Ph.D., Microbiology, University of New Hampshire, 1984

PROFESSIONAL AND RESEARCH EXPERIENCE:
Teaching Assistant, Northeastern University, 1976-1980
Teaching Assistant, University of New Hampshire, 1980-1983
Research Assistant, University of New Hampshire, 1983-1984
Postdoctoral Research Associate, Brandeis University, 1984-1986
Postdoctoral Investigator, Woods Hole Oceanographic Institution, 1986-1988
Visiting Investigator, Woods Hole Oceanographic Institution, 1988-1990
Assistant Professor, Department of Anaerobic Microbiology, Virginia Polytechnic Institute and State University, 1990-1993
Visiting Scientist, Woods Hole Oceanographic Institution, Summer, 1990
Participating Faculty, Environmental Magnetism Workshop, University of Minnesota, 1991
Visiting Associate Professor, Department of Chemistry and Chemical Engineering, Stevens Institute of Technology, 1993
Adjunct Associate Research Professor, Marine Science Center, Northeastern University, 1993-1995
Associate Professor, Department of Microbiology, Iowa State University, 1995-2002
Associate Professor, Department of Biochemistry, Biophysics, and Molecular Biology, Iowa State University, 2002-present

RELEVANT PROFESSIONAL AND SYNERGISTIC ACTIVITIES:
Participant on research cruises to the Gulf of Maine (R/V *CAPE HATTERA*S: 1982 and 1983), the West Florida Escarpment cold seep site (R/V *ATLANTIS II-ALVIN* Research cruise #118/2; 1987), the Guaymas Basin hydrothermal vents (R/V *ATLANTIS II-ALVIN* cruise #118/28; 1988), the Black Sea (R/V *KNORR* cruise #134/12; 1988), to the Chesapeake Bay (R/V *CAPE HENLOPE*N; 1992), and the Santa Barbara Basin (R/V *ROBERT GORDON SPROW*L; 1996, 1997, 1999). Invited participant to the Biocorrosion Workshop, Office of Naval Research, Washington, DC (1991); the Sedimentary Biogeomagnetism Workshop, University of Minnesota, Minneapolis, MN (1995); the Biomineralization and Nanofabrication Workshop, Office of Naval Research, California Polytechnic State University, San Luis Obispo, CA (1996); the Workshop on "Magnetofossils on Earth, Mars, and Meteorites", NASA Ames; Moffett Field, CA (1996); and the American Academy of Microbiology colloquium "Geobiology: Exploring the Interface Between the Biosphere and the Geosphere", Tucson, AZ (2000). Chair-elect of Division I (General Microbiology) of the American Society for Microbiology 2002-2003; Chair of Division I 2003-2004; Division Advisor 2004-2005.

B. 10 SELECTED PUBLICATIONS: 172 Total (67 Research Articles; 20 Book Chapters; 85 Abstracts). Below are recent publications or those relevant to the proposed research.

1. Bazylinski, D.A., R.B. Frankel and H.W. Jannasch. 1988. Anaerobic magnetite production by a

marine magnetotactic bacterium. Nature 334: 518-519.
2. Bazylinski, D.A., R.B. Frankel, A.J. Garratt-Reed, and S. Mann. 1990. Biomineralization of iron sulfides in magnetotactic bacteria from sulfidic environments. *In: Iron Biominerals*, R.B. Frankel and R.P. Blakemore (eds.), Plenum Press, New York, NY; pp. 239-255.
3. Bazylinski, D.A., R.B. Frankel, B.R. Heywood, S. Mann, J.W. King, P.L. Donaghay, and A.K. Hanson. 1995. Controlled biomineralization of magnetite (Fe_3O_4) and greigite (Fe_3S_4) in a magnetotactic bacterium. Appl. Environ. Microbiol. 61:3232-3239.
4. Posfai, M., P.R. Buseck, D.A. Bazylinski, and R.B. Frankel. 1998. Reaction sequence of iron sulfide minerals in bacteria and their use as biomarkers. Science 280:880-883.
5. Mandernack, K.W., D.A. Bazylinski, W.C. Shanks, and T.D. Bullen. 1999. Oxygen and isotope studies of magnetite produced by magnetotactic bacteria. Science 285:1892-1896.
6. Bazylinski, D.A., D.R. Schlezinger, B.H. Howes, R.B. Frankel, and S.S. Epstein. 2000. Occurrence and distribution of diverse populations of magnetic protists in a chemically-stratified coastal salt pond. Chem. Geol. 169:319-328.
7. Bazylinski, D.A., and R.B. Frankel. 2004. Magnetosome formation in prokaryotes. Nature Rev. Microbiol. 2: 217-230.
8. Simmons, S.L., S.M. Sievert, R.B. Frankel, D.A. Bazylinski, and K.J. Edwards. 2004. Spatio-temporal distribution of marine magnetotactic bacteria in a seasonally stratified coastal salt pond. Appl. Environ. Microbiol. 70: 6230-6239.
9. Dubbels, B.L., A.A. DiSpirito, J.D. Morton, J.D. Semrau, J.N.E. Neto, and D.A. Bazylinski. 2004. Evidence for a copper-dependent iron transport system in the marine, magnetotactic bacterium strain MV-1. Microbiology 150: 2931-2945.
10. Bazylinski, D.A., A.J. Dean, T.J. Williams, L. Kimble Long, S.L. Middleton, and B.L. Dubbels. 2004. Chemolithoautotrophy in the marine, magnetotactic bacterial strains MV-1 and MV-2. Arch. Microbiol. 182: 373-387.

C. COLLABORATORS: Over last 48 months.
T.D. Bullen, P.R. Buseck, S.J. Clemett, B.L. Cox, D. Dahlberg, B. Devouard, A.A. DiSpirito, S. Douglas, R.E. Dunin-Borkowski, K. Edwards, S.S. Epstein, R.B. Frankel, E.K. Gibson Jr., B.H. Howes, X. Hua, J.L. Kirschvink, B. Lanoil, D.R. Lovley, K.W. Mandernack, M.R. McCartney, D.S. McKay, B.M. Moskowitz, K.H. Nealson, E.J.P. Phillips, R. Popa, M. Posfai, R. Proksch, I. Revenko, C.S. Romanek, D.R. Schlezinger, D. Schüler, W.C. Shanks, S. Simmons, S. Spring, K. Thomas-Keprta, H. Vali, S.J. Wentworth, J. Wittborn, J.-P. Zhang

D. GRADUATE STUDENTS AND POSTDOCTORAL SCHOLARS
Graduate Students (Total: 4): Ms. Annette Dean, Mr. Bradley L. Dubbels, Mr. Jose Neto, and Ms. Karen Paul
Postdoctoral Scholars (Total: 2): Dr. Linda K. Kimble, Dr. Dirk Schüler, and Dr. Timothy Williams

E. GRADUATE AND POSTDOCTORAL ADVISORS
M.S. Thesis Advisor: Dr. Frederick A. Rosenberg
Ph.D. Advisor: Dr. Richard P. Blakemore
Postdoctoral Advisor: Dr. Thomas C. Hollocher
Postdoctoral Advisor: Dr. Holger W. Jannasch

Jay Burton Benziger

Department of Chemical Engineering
Princeton University
Princeton, NJ 08544-5263
Phone (609) 258-5416
FAX (609) 258-0211
Email benziger@princeton.edu

Carleton College (BA), Columbia University (MS), Stanford University (Ph.D. 1979)
Visiting Scientist Air Force Rocket Propulsion Laboratory(1981)
Visiting Professor of Chemistry University of Cincinnati (1991)
Professor of Chemical Engineering, Princeton University (1979 -)

Professor Benziger's interests are in chemical reaction engineering and catalysis. His recent work has focused on reactors for organic vapor deposition for electronic devices, design, operation and control of Polymer Membrane Fuel Cells, and new reactor processing for sulfur removal from petroleum. In collaboration with Professor Steve Forrest Professor Benziger and has developed new reactor designs for the successful implementation of continuous large scale process of organic thin films for OLEDs and patterning methods with Organic Vapor Phase Jet Deposition. This work has successfully demonstrated the key design and control parameters for OVPD and OVJP key to the demonstrations of these techniques by Professors Forrest's and Benziger's groups. In the Fuel Cell area Professor Benziger's group has developed new reactor configurations for Polymer Electrolyte Membrane Fuel Cells that provide the essential information for controlling the dynamic behavior of PEM fuel cells. This work has demonstrated the existence of steady state multiplicity in PEM fuel cells along with a key discovery of the coupling of the chemical reaction in the fuel cell with mechanical relaxation processes in the polymer membrane. Professor Benziger and his group have demonstrated a new sulfur recovery process for hydrocarbons streams that operates at low temperature and with has very low energy requirements. As a member of the Borexino collaboration Professor Benziger has led the effort for achieving ultra high purity in multi-ton quantities of aromatic solvents required for the Borexino solar neutrino detector. Professor Benziger co-authored over 100 papers in refereed journals, and given over 50 invited talks on subjects related to reaction and process engineering. He has received the Exxon Award in Solid State Chemistry from the Inorganic Chemistry Division of the American Chemical Society, and the Purdy Award from the American Ceramic Society.

Recent Publications

Back, H. O., M. Belata, et al. (2003). "New experimental limits on heavy neutrino mixing in B-8-decay obtained with the Borexino Counting Test Facility." Jetp Letters 78(5): 261-266.

Back, H. O., M. Balata, et al. (2003). "New limits on nucleon decays into invisible channels with the BOREXINO counting test facility." Physics Letters B 563(1-2): 23-34.

Back, H. O., M. Balata, et al. (2003). "Study of neutrino electromagnetic properties with the prototype of the Borexino detector." Physics Letters B 563(1-2): 35-47.

Moxley, J. F., S. Tulyani, et al. (2003). "Steady-state multiplicity in the autohumidification polymer electrolyte membrane fuel cell." Chemical Engineering Science 58(20): 4705-4708.

Shtein, M., P. Peumans, et al. (2003). "Micropatterning of small molecular weight organic semiconductor thin films using organic vapor phase deposition." Journal of Applied Physics 93(7): 4005-4016.

Nehlsen, J., Benziger J.B. and Kevrekidis, I.G. (2003) "Removal of Alkanethiols from a Hydrocarbon Mixture by a Heterogeneous Reaction with Metal Oxides." Industrial Engineering Chemistry Research 42: 6919-6923.

Nehlsen, J., Benziger, J.B. and Kevrekidis, I.G. (2004) "A Process for the Removal of Thiols from a Hydrocarbon Stream by Heterogeneous Reaction with Lead Oxide", Energy and Fuels 18:721-726.

Yang, C., Srinivasan, S., Bocarsly, A.B., Tulyani, S., Benziger, J.B. (2004) "A comparison of physical properties and fuel cell performance of Nafion and zirconium phosphate/Nafion composite membranes," Journal of Membrane Science 237: 145-161.

Benziger, J., Chia, E., Karnas, E., Moxley, J. Teuscher, C., Kevrekidis, I.G., (2004) "The Stirred Tank Reactor Polymer Electrolyte Membrane Fuel Cell", AIChE Journal 50:1889-1900.

Chen, S.-L., Krishnan, L., Srinivasan, S., Benziger, J.B., Bocarlsy, A.B., (2004), "Ion exchange resin/polystyrene sulfonated composite membranes for PEM fuel cells," Journal of Membrane Science 243: 327-333.

Chia, E-S.J., Benziger, J.B. and Kevrekidis, I.G., (2004), "Water balance and multiplicity in a polymer electrolyte membrane fuel cell," AIChE Journal 50:2320-2324.

Shtein, M., Peumans, P., Benziger, J.B., Forrest, S.R., (2004), "Direct, Mask- and Solvent-Free Printing of Molecular Organic Semiconductors," Advanced Materials 16: 1615-1620.

H.O. Back et al. (2004), "New experimental limits on violations of the Pauli exclusion principle obtained with the Borexino Counting Test Facility," European Physical Journal C **37**: 421-431.

Biographical Sketch

JEFF C. BLACKMON
blackmon@ornl.gov
(865) 574-7834

Physics Division, Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN 37831

A. PROFESSIONAL PREPARATION

University of North Carolina at Chapel Hill	Physics	Ph.D.	1994
University of North Carolina at Chapel Hill	Physics	M.S.	1994
Guilford College	Physics	B.S.	1989

B. APPOINTMENTS

Research Staff Member, Oak Ridge National Laboratory 1997-present
Research in experimental nuclear astrophysics and the structure of exotic nuclei.
Recipient 2002 Presidential Early Career Award for Scientists and Engineers
Recipient 2000 ORNL Author of the Year Award

Postdoctoral Research Associate, ORNL & University of North Carolina 1995-1997

Lecturer, Guilford College 1994-1995

C. PUBLICATIONS

1. "Experimental approaches to hot and explosive burning," J. C. Blackmon, C. Angulo, and A. C. Shotter, Nucl. Phys. A, in press.
2. "First Study of the Level Structure of the r-Process Nucleus ^{83}Ge," J. S. Thomas, D. W. Bardayan, J. C. Blackmon, J. A. Cizewski, U. Greife, C. J. Gross, M. S. Johnson, K. L. Jones, R. L. Kozub, J. F. Liang, R. J. Livesay, Z. Ma, B. H. Moazen, C. D. Nesaraja, D. Shapira, and M. S. Smith, Phys. Rev. C, in press.
3. "Study of the ^{124}Sn(d,p) reaction in inverse kinematics close to the Coulomb barrier," K. L. Jones, R. L. Kozub, C. Baktash, D. W. Bardayan, J. C. Blackmon, W. N. Catford, J. A. Cizewski, R. P. Fitzgerald, M. S. Johnson, R. J. Livesay, Z. Ma, C. D. Nesaraja, D. Shapira, M. S. Smith, J. S. Thomas, and D. W. Visser, Phys. Rev. C 70 067602 (2004).
4. "Investigation of the ^{23}Na(p,γ)^{24}Mg and ^{23}Na(p,α)^{20}Ne reactions via (^{3}He,d) spectroscopy," S. E. Hale, A. E. Champagne, C. Iliadis, V. Y. Hansper, D. C. Powell, and J. C. Blackmon, Phys. Rev. C 70, 045802 (2004).
5. "Search for astrophysically important ^{19}Ne levels with a thick-target ^{18}F(p,p)^{18}F measurement," D. W. Bardayan, J. C. Blackmon, J. Gómez del Campo, R. L. Kozub, J. F. Liang, Z. Ma, L. Sahin, D. Shapira, and M. S. Smith, Phys. Rev. C 70, 015804 (2004).
6. "Strength of the ^{18}F(p,α)^{15}O Resonance at $E_{c.m.}$ = 330 keV," D. W. Bardayan, J. C. Batchelder, J. C. Blackmon, A. E. Champagne, T. Davinson, R. Fitzgerald, W. R. Hix, C. Iliadis, R. L. Kozub, Z. Ma, S. Parete-Koon, P. D. Parker, N. Shu, M. S. Smith, and P. J. Woods, Phys. Rev. Lett. 89, 262501 (2002).
7. "Thermal-neutron capture by ^{208}Pb," J. C. Blackmon, S. Raman, J. K. Dickens, R. M. Lindstrom, R. L. Paul, and J. E. Lynn Phys. Rev. C 65, 045801 (2002).
8. "Astrophysically important ^{26}Si states studied with the ^{28}Si(p,t)^{26}Si reaction," D.W. Bardayan, J. C. Blackmon, A. E. Champagne, A. K. Dummer, T. Davinson, U. Greife, D. Hill, C. Iliadis, B. A. Johnson, R. L. Kozub, C. S. Lee, M. S. Smith, and P. J. Woods, Phys. Rev. C 65, 032801 (2002).
9. "Stellar Reactions with Short-Lived Nuclei: ^{17}F(p,α)^{14}O," B. Harss, J. P. Greene, D. Henderson, R. V. F. Janssens, C. L. Jiang, J. Nolen, R. C. Pardo, K. E. Rehm, J. P. Schiffer, R. H. Siemssen, A. A. Sonzogni, J. Uusitalo, I. Wiedenhöver, M. Paul, T. F. Wang, F. Borasi, R. E. Segel, J. C. Blackmon, M. S. Smith, A. Chen, and P. Parker, Phys. Rev. Lett. **82**, 3964 (1999).

10. "Measurement of the $^{17}O(p,\alpha)^{14}N$ Cross Section at Stellar Energies," J. C. Blackmon, A. E. Champagne, M. A. Hofstee, M. S. Smith, R. G. Downing, and G. P. Lamaze, Phys. Rev. Lett. 74, 2642 (1995).

D. SYNERGYSTIC ACTIVITIES

- HRIBF Physics Advisory Council, 1994-present
- APS Division of Nuclear Physics Program Committee, 2003-2004
- Co-Organizer (with D. J. Dean), 2003 National Nuclear Physics Summer School

E. COLLABORATORS AND OTHER AFFILIATIONS

Oak Ridge National Laboratory, Oak Ridge, TN
D. W. Bardayan, C. Baktash, J. C. Batchelder, V. Cianciolo, Yu. Efremenko, J. Gómez del Campo, J. K. Dickens, C. J. Gross, W. R. Hix, M. S. Johnson, J. F. Liang, C. D. Nesaraja, S. Raman (deceased), D. Radford, D. Shapira, M. S. Smith, G. R. Young, C.-H. Yu
University of Alabama, Tuscaloosa, AL
I. Stancu
Colorado School of Mines, Golden, CO
U. Greife, F. Sarazin
University of Edinburgh, Edinburgh, UK
T. Davinson, P. J. Woods
University of Houston, Houston ,TX
E. Hungerford, A. Lan
University of North Carolina, Chapel Hill, NC
A. E. Champagne, C. Iliadis
Rutgers University, New Brunswick, NJ
J. A. Cizewski
University of Surrey, Guildford, UK
W. A. Catford,
Tennessee Technological University, Cookeville, TN
R. L. Kozub
Texas A&M University, College Station, TX
C. Gagliardi, A. M. Mukhamedzhanov, L. Trache, R. Tribble
TRIUMF, Vancouver, BC
A. C. Shotter
Yale University, New Haven, CT
P. D. Parker

Graduate advisor: Art Champagne (University of North Carolina)

Postdoctoral advisors: Michael Smith (ORNL), Art Champagne (University of North Carolina)

Thesis and Postdoctoral advisees: D. W. Bardayan, R. P. Fitzgerald, V. Y. Hansper, M. S. Johnson, K. L. Jones, S. D. Pain, B. C. Rasco, L. Sahin, J. S. Thomas, D. W. Visser

ANTONIO BOBET

A. Professional Preparation:

U. Politénica de Madrid, Spain. Ing. de Caminos, Canales y Puertos	1977-1983
Doctor of Science (Sc.D.). Massachusetts Institute of Technology.	1992-1997

B. Appointments:

Purdue University. Associate Professor	2003-present
Purdue University. Assistant Professor	1997-2003
FERROVIAL, S.A. Spain. Construction Manager.	1988-1992
EUROESTUDIOS S.A. Spain. Consulting Engineer.	1984-1988

Fields of expertise: Rock Mechanics, Fracture Mechanics, Tunneling, Engineering Geology

C. Publications:

Five publications related to current project:

Bobet, A. and Mutlu, O. (2005). Stress and Displacement Discontinuity Element Method for Undrained Analysis. *Engineering Fracture Mechanics Journal*. In press.

Mutlu, O., and Bobet, A. (2005). Slip Initiation on Frictional Fractures. *Engineering Fracture Mechanics Journal*, Vol. 72, pp. 729-747.

Sagong, M. and Bobet, A. (2003). Micro-fractographic Characterization of Tensile and Shear Cracks. *Proceedings of the Soil and Rock America 2003 Symposium*, pp. 937-944.

Sagong, M. and Bobet, A. (2002). Coalescence of Multiple Flaws in a Rock-model Material in Uniaxial Compression. *Int. J. of Rock Mechanics and Mining Sciences,* Vol. 39, No. 2, pp. 229-241.

Bobet, A. (2001). A Hybridized Displacement Discontinuity Method for Mixed Mode I-II-III Loading. *Int. J. of Rock Mechanics and Mining Sciences*, Vol. 38, pp. 1121-1134.

Other five significant recent publications:

Bobet, A. and Einstein, H.H. (2004). Crack Coalescence in Brittle Materials: An Overview. *Rock Engineering, Theory and Practice, Proceedings of the ISRM Regional Symposium EUROCK 2004 & 53rd Geomechanics Colloquy*. W. Schubert Editor. VGE, Essen, Germany, pp. 475-478.

Mutlu O., Bobet A. (2004). Slip on Non-Homogeneous Discontinuities. *Proceedings of the 6th North America Rock Mechanics Symposium (NARMS)*, Houston, Texas, June 2004, Paper No. 04-506, 9 pages.

Gur, T., Ramirez, J.A., Sozen, M.A., Pay, A.C., Johnson, A.M., Bobet, A., Matamoros, A., Irfanoglu, A., And Akin, L. (2004). Performance of School Buildings in Bingöl during the 1 May 2003 Earthquake. *13th World Conference on Earthquake Engineering*, Vancouver, B.C., Canada. Paper No. 1017, 15 Pages.

Lee, H.S. and Bobet, A. (2004). Laboratory Evaluation of Pullout Capacity of Reinforced Silty Sands in Drained and Undrained Conditions. *Geotechnical Testing Journal*. In press.

Bobet, A. (2003). Effect of Pore Water Pressure on Tunnel Support During Static and Seismic Loading. *Tunnelling and Underground Space Technology*, Vol. 18, pp. 377-393.

D. Synergistic Activities:

• ***Editorial Activity / Committee Activities***

2001-present	Member of the Rock Mechanics Committee, Geo-Institute, ASCE
2002-present	Member of the Property of Materials Committee, Engineering Mechanics Division, ASCE
2002-present	Editorial Board Member, Journal of Geotechnical and Geoenvironmental Engineering, ASCE
2004-present	Editorial Board Member, ASTM Geotechnical Testing Journal

Reviewer of a number of International Journals including: Rock Mechanics and Rock Engineering Journal; ASCE, Journal of Geotechnical and Geoenvironmental Engineering; International Journal of Rock Mechanics and Mining Sciences; ASCE, Journal of Materials in Civil Engineering; Engineering Fracture Mechanics Journal; ASCE Journal of Engineering Mechanics; International Journal of Analytical and Numerical Methods in Geomechanics; Engineering Geology; Soil and Rock 2003.

• ***Cooperation with foreign institutions***

2002- present	Coordinator of agreement of cooperation and exchange of graduate and undergraduate students, faculty, and research between the Schools of Civil Engineering of Technical University of Catalonia, Spain, and Purdue University.

E. Collaborators and Other Affiliations:

(i) Collaborators during the past 5 years:

G. Aristorenas, Weidlinger Associates, Inc.; V.P. Drnevich, Purdue University; H.H. Einstein, M.I.T.; G. Fernandez, U. of Illinois at Urbana-Champain; P. Fox, U.C. Los Angeles; A. Johnson, Purdue University; J. Ramirez, Purdue University; M. Santagata, Purdue University; R. Salgado, Purdue University; M. Sozen, Purdue University; B. Vásárhelyi, Technical University of Budapest; P. Vinard, Swiss Space Office, Berne.

No co-editors to report.

(ii) Graduate advisors:

H.H. Einstein, S. Suresh, C.K. Leung, Massachusetts Institute of Technology.

(iii) Graduate and thesis advising:

2000. Ahmed Bayoumi (MSCE)
2000. Wei-I Chou (MSCE)
2000. Dimitrios Loukidis (MSCE)
2001. Jose Asyn (MSCE)
2001. Aaron Humphrey (MSCE)
2001. Myung Sagong (Ph.D.)
2002. Hongbin Huo (MSCE)
2003. Hong-Sung Lee (Ph.D.)

Doug A. Bowman

Dept. of Computer Science (0106)
660 McBryde Hall
Virginia Tech
Blacksburg, VA 24061
(540) 231-2058
bowman@vt.edu
http://people.cs.vt.edu/~bowman/

Education

Emory University, Atlanta, Georgia	Mathematics/Computer Science	B.S.	1994
Georgia Institute of Technology, Atlanta, Georgia	Computer Science	M.S.	1997
Georgia Institute of Technology, Atlanta, Georgia	Computer Science	Ph.D.	1999

Appointments

Assistant Professor Virginia Tech, Computer Science Department 08/10/99 – present

Selected Funded Research

- D. Bowman, "CAREER: Domain-Specific 3D Interaction Techniques for Design and Construction Tasks in Immersive Virtual Environments." NSF CAREER program, June 2003-May 2008, $500,000.
- M. Gutierrez, M. Mauldon, J. Dove, E. Westman, and D. Bowman, "ITR: Adaptive and Real-Time Geologic Mapping, Analysis and Design of Underground Space (AMADEUS)." NSF Information Technology Research program, Sept. 2003-August 2007, $1,067,117.
- D. Bowman, M. Setareh, and S. Varadarajan, "Interactive Virtual Environments for Science and Engineering Education." NSF Course, Curriculum, and Laboratory Improvement (CCLI) program, June 2002-May 2003, $74,824.
- S. Varadarajan, D. Bowman, and R. Kriz, "Multi-Parametric Data Visualization on Workstation Clusters." Institute for Software Research, July 2001-December 2002, $65,001.
- W. Thabet and D. Bowman, "Evaluating the Effectiveness of Virtual Environments for Decision Support In Construction Planning." Virginia Tech ASPIRES program, January-December 2002, $56,800.
- T. Ollendick and D. Bowman, "Virtual Reality Exposure to Treat Phobias in Children and Adolescents." Virginia Tech ASPIRES program, January 2002-May 2003, $28,490.

Selected List of Publications

- Bowman, D., Kruijff, E., LaViola, J., and Poupyrev, I. *3D User Interface Design: Theory and Practice*. Addison-Wesley, 2004.
- Thabet, W., Shiratuddin, M., and Bowman, D. Virtual Reality in Construction: A Review. In Topping, B. and Bittnar, Z. (Eds.), Engineering Computational Technology, Saxe-Coburg, Stirling, Scotland, 2002, pp. 25-52.
- Setareh, M., Bowman, D., and Tumati, P. Development of a Collaborative Design Tool for Structural Analysis in an Immersive Virtual Environment. In the *Proceedings of the International Building Performance Simulation Association Conference*, 2001.
- Bowman, D., North, C., Chen, J., Polys, N., Pyla, P., and Yilmaz, U. Information-Rich Virtual Environments: Theory, Tools, and Research Agenda. *Proceedings of ACM Virtual Reality Software and Technology*, 2003, pp. 81-90.
- Bowman, D. Wineman, J., Hodges, L., and Allison, D. The Educational Value of an Information-Rich Virtual Environment. Presence: Teleoperators and Virtual Environments, vol. 8, no. 3, June 1999, pp. 317-331.
- Bowman, D., Hodges, L., and Bolter, J. The Virtual Venue: User-Computer Interaction in Information-Rich Virtual Environments. Presence: Teleoperators and Virtual Environments, vol. 7, no. 5, 1998, pp. 478-493.

- Bowman, D., Gabbard, J., and Hix, D. A Survey of Usability Evaluation in Virtual Environments: Classification and Comparison of Methods. Presence: Teleoperators and Virtual Environments, vol. 11, no. 4, 2002, pp. 404-424.
- Bowman, D. Principles for the Design of Performance-Oriented Interaction Techniques. In Stanney, K. (Ed.). Handbook of Virtual Environments, Lawrence Erlbaum, Mahwah, New Jersey, 2002, pp. 277-300.
- Bowman, D., Kruijff, E., LaViola, J., and Poupyrev, I. An Introduction to 3D User Interface Design. Presence: Teleoperators and Virtual Environments, vol. 10, no. 1, 2001, pp. 96-108.
- Bowman, D., Johnson, D., and Hodges, L. Testbed Evaluation of VE Interaction Techniques. Proceedings of the ACM Symposium on Virtual Reality Software and Technology, 1999, pp. 26-33.

Selected Courses

- *Virtual Environments*: Students learn the basics of VE technology and software, and complete a semester research project involving design or implementation. In 2000, this course was taught both live and via interactive videoconferencing to students in Northern Virginia. In 2002 and 2003, this course was combined with other VE courses around the country using distance learning tools. Class time includes traditional lectures, live demonstrations, discussion of current publications, and student presentations.
- *Computer Graphics*: Students learn concepts behind both 2D and 3D graphics, as well as practical implementation skills in programming projects. Students are encouraged to create a final project of their own choosing. One student developed a visualization tool for chemical engineers currently in use by Virginia Tech scientists.
- *Human-Computer Interaction*: Students learn basic issues and guidelines for user interface design. A large amount of class discussion is encouraged. Students work in teams on a design project to create and evaluate a prototype user interface for a non-traditional interactive system. Project teams participate in a weekly "studio" in which they present their progress and answer questions from the class.

Synergistic Activities

- Founder, 3DI research group and VE research group, Virginia Tech
- Co-founder, Virginia Tech Center for Virtual Environments and Visualization, 1999.
- Organizer and speaker, tutorial on 3D Interaction, IEEE Virtual Reality 1999, 2000; ACM VRST, 1999; ACM SIGGRAPH, 2000, 2001.
- Guest editor of a special issue of *Virtual Reality* on interaction in virtual and mixed realities, 2002
- Video chair, IEEE Virtual Reality conference, 2002 and 2003.
- Exhibits chair, IEEE Virtual Reality conferences, 2000 and 2001.
- Co-founder, 3D User Interface mailing list (http://www.3dui.org).

Recent Collaborators

Dr. D. Cox (Virginia Tech), J. Gabbard (Virginia Tech), Dr. D. Gracanin (Virginia Tech), Dr. D. Hix (Virginia Tech), Dr. M. Gutierrez (Virginia Tech), Dr. L. Hodges (Georgia Tech), Dr. R. Kriz (Virginia Tech), E. Kruijff (Bauhaus University-Weimar/GMD), J. LaViola (Brown University), Dr. C. North (Virginia Tech), Dr. T. Ollendick (Virginia Tech), Dr. J. Pierce (Georgia Tech), M. Pinho (PUCRS, Brazil), Dr. I. Poupyrev (Sony Computer Science Labs), Dr. G. Robertson (Microsoft Research), Dr. M. Setareh (Virginia Tech), Dr. W. Thabet (Virginia Tech), Dr. S. Varadarajan (Virginia Tech).

Advising

- Marcio Pinho, Ph.D. Topic: Cooperative 3D manipulation. (Defended December 2002).
- Wendy Schafer, Ph.D. Topic: Representations for spatial collaboration. (Defended May 2004)
- Jian Chen, Ph.D. student. Topic: Domain-specific 3D interaction for the AEC domain.
- Nicholas Polys, Ph.D. student. Topic: Cognitive and perceptual issues in information-rich VEs.
- Chad Wingrave, M.S. student. Topic: Nuance-oriented interfaces for VEs. (Defended July 2001).
- Ameya Datey, M.S. student: Topic: Immersive information visualization. (Defended May 2002).
- Numerous graduate and undergraduate independent study students.

Thomas J. Burbey
Associate Professor
Dept. of Geosciences, Virginia Tech
Blacksburg, VA 24061-0420
Phone: (540) 231-6696
Email: tjburbey@vt.edu
Fax: (540) 231-3386

Academic and Professional Positions

2002-present	Associate Professor, Hydrogeosciences, Virginia Tech, Blacksburg, VA
1996-2002	Assistant Professor, Hydrogeosciences, Virginia Tech, Blacksburg, VA.
1984-96:	Hydrologist, U.S. Geological Survey, Water Resources Division, Carson City, NV.
1982-84:	Research Assistant, Desert Research Institute, University of Nevada System, Reno, NV.

Education:

B.S. in Geology, University of Wisconsin, Madison. WI, May 1981.
M.S. in Hydrology/Hydrogeology, University of Nevada, Reno, NV, May 1984.
Ph.D. in Hydrology/Hydrogeology, University of Nevada, Reno, NV, May 1994.

Professional Society Membership and affiliations

National Ground Water Association, 1982-present.
American Geophysical Union, 1994-present.
Associate Editor, *Ground Water* Journal, 2000-present
Board of Directors, CUAHSI, 2002-2005

Recent Selected Publications

Pope J.P. and Burbey T.J., 2004, Multiple-aquifer characterization from single extensometer records: Ground Water, v.42, no.1, p. 45-58.

Gentry, W.M, and Burbey, T.J., 2004, Characterization of groundwater flow from spring discharge in a crystalline-rock environment: Amer. Water Resour. Assoc., v. 40, no. 5, p. 1205-1217.

Seaton, W.J., and Burbey, T.J., 2004 (in press) Influence of ancient thrust faults on the hydrogeology of the Blue Ridge Province: Ground Water

Burbey, T.J., 2003, Use of time-subsidence data during pumping to characterize specific storage and hydraulic conductivity of semi-confining units: Jour. of Hydrology, v. 281(1-2),. p. 3-22.

Burbey, T.J., 2002, The influence of faults in basin-fill deposits on land subsidence, Las Vegas, Nevada, USA: Hydrogeology Journal, v. 10, no. 5, pp. 525-538.

Seaton, W.J., and Burbey, T.J., 2002, Evaluation of two-dimensional resistivity methods in a fractured crystalline rock terrane: Jour. of Applied Geophysics, v. 51, pp. 21-41.

Burbey, T.J., 2001, Stress-strain analyses for aquifer-system characterization: Ground Water, v. 39, no. 1, pp. 128-136.

Burbey, T.J., 2001, Storage coefficient revisited: Is purely vertical strain a good assumption?: Ground Water, v. 39, no. 3, p. 458-464.

Burbey, T.J., Younos, Tamim, and Anderson, E.T., 2000, Hydrologic analysis of discharge sustainability from an abandoned coal mine: Jour. of the Amer. Water Resour. Assoc., v. 36, no. 5, pp. 1161-1172.

Seaton, W.J., and Burbey T.J., 2000 Aquifer characterization in the Blue Ridge Physiographic Province using resistivity profiling and borehole geophysics: Jour. of Environ. and Eng. Geophysics, v. 5, no. 3, pp. 45-58.

Burbey, T J., 1999, Effects of horizontal strain in estimating specific storage and compaction in confined and leaky aquifer systems: Hydrogeology Journal, v. 7, no. 6., pp. 521-532.

Burbey, T.J., and Helm D.C., 1999, Modeling three-dimensional deformation in response to pumping of unconsolidated aquifers: Environmental and Engineering Geoscience: v. 5, no 2, p. 199-212.

Graduate Advisors

Steve Wheatcraft (M.S.) - University of Nevada, Reno.

Donald C. Helm (Ph.D.) - Morgan State University.

Students who have completed graduate degrees under my supervision:

DeBonne Wishart, M.S., Fall 2000, "Hydrogeology and simulated water budget of the Rio Cobre and Rio Minho-Milk River Basins, Jamaica, West Indies". Virginia Tech, Geol. Sci.

William J. Seaton, PhD, Spring 2002, "Aquifer characterization in the Blue Ridge Physiographic Province", Virginia Tech, Geol. Sci.

Jason Pope, M.S., Spring 2002, "Land subsidence and hydrogeologic conditions near Franklin Virginia, Virginia Coastal Plain". Virginia Tech, Geol. Sci.

Miles Gentry, M.S. Spring 2003, "Evaluation of spring discharge for characterization of groundwater flow in fractured crystalline aquifers—Blue Ridge Province", Virginia Tech, Geol. Sci.

Sandra Warner, M.S. Spring 2004, "Using GPS to quantify three-dimensional storage and aquifer deformation in the Virgin River Valley, NV". Geosciences

Sam Harvey, M.S., Spring 2004, "Thermal history of the Chesapeake Bay impact crater". Geosciences.

Funded Research (selected)

1. Virginia Tech, CIL, "Interactive web-based learning for groundwater transport and contamination: a multi-tiered approach", 1997, Co P.I., $25,383. one time.
2. Virginia Water Resources Research Center, "Hydrological reconnaissance of the Piedmont and Blue Ridge Provinces for characterization of fracture flow", 1997, P.I., $5000.
3. Virginia Water Resources Research Center, "Wellhead protection in the Piedmont and Blue Ridge Provinces: Analysis of flow conditions and evaluation of current state regulations", 1998, $5,000, one year.
4. Virginia Water Resources Research Center, "A non-invasive cost-efficient methodology for identifying production zones and recharge source areas in fractured or faulted rocks", 1999-2001, P.I., $50,000..
5. National Science Foundation, "Assessing horizontal strain and deformation from extensometer data", 1999-2001, P.I., $102,000.
6. Virginia Water Resources Research Center, "Geologic and hydrodynamic modeling to evaluate the occurrence of the Virginia inland salt wedge associated with the Chesapeake Bay impact crater", 2001-2002, P.I., $5000. one time.
7. National Science Foundation, 2001-2004, $236,229. "Assessing Aquifer Properties from stress and strain distributions in leaky-confined aquifers using INSAR, GPS and three-dimensional deformation and flow modeling". P.I. (includes NBMG portion of project).
8. Virginia Department of Environmental Quality, "Hydrophysical and hydrochemical assessment of natural springs in the Blue Ridge Province of Virginia", P.I., 2001-2002, $6,000.
9. Virginia Department of Environmental Quality, "Assessment of recharge to springs in the Blue Rigde Province", P.I. 2003, $9,000.
10. Virginia Department of Environmental Quality, "Identification of recharge source areas in the Blue Ridge Province", P.I., 2004, $21,900
11. Virginia Department of Environmental Quality, "Transport and flow pathways in a structurally conmplex fractured rock terrane, P.I., 2005-2006, $25,000, 2 years.

Biographical Sketch

ARTHUR E. CHAMPAGNE
artc@physics.unc.edu
(919) 962-7205

Department of Physics and Astronomy
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-3255

EDUCATION

Ph.D., Yale University	Physics	1982
M. Phil., Yale University	Physics	1982
M.S., Yale University	Physics	1982
B.S., Trinity College	Physics	1978

PROFESSIONAL POSITIONS

Professor, University of North Carolina at Chapel Hill,	1995-present
Assistant Chair, Dept. of Physics and Astronomy, UNC-CH,	2000-2002, 2004-present
Edouard Morot-Sir Professor, UNC-CH,	1996-2001
Associate Professor, UNC-CH,	1990-1995
Assistant Professor and Faculty Fellow, Princeton University,	1985-1990
Instructor, Princeton University,	1984-1985
Post-Doctoral Fellow, SUNY-Stony Brook,	1982-1984

ACADEMIC HONORS

Junior Faculty Development Award (UNC-CH)
Distinguished Term Professorship (UNC-CH)
Fellow, American Physical Society

RESEARCH INTERESTS

Nuclear astrophysics, including measurements of reactions relevant to stellar evolution, stellar explosions, and the solar neutrino problem.
Development of low-background detection systems

Publications and activities closely related to proposed project:

1. "Solar Fusion Rates", E. Adelberger, S.M. Austin, J.N. Bahcall, A.B. Balantekin, G. Bertsch, G. Bogaerts, L. Buchmann, F.E. Cecil, A.E. Champagne, L. deBraeckeleer, C. A. Duba, S.R. Elliott, S.J. Freedman, M. Gai, G. Goldring, C.R. Gould, A. Gruzinov, W.C. Haxton, K.M. Heeger, M. Kamionkowski, R.W. Kavanagh, S.E. Koonin, K. Kubodera, K. Langanke, T. Motobayashi, V. Pandharipande, P. Parker, R.G.H. Robertson, C. Rolfs, R. Sawyer, N. Shaviv, T.D. Shoppa, K. Snover, E. Swanson, R.E. Tribble, S. Turck-Chize, and J.F. Wilkerson, Rev. Mod. Phys. **70** 1265 (1998).
2. "Studies of Weak Capture γ-Ray Resonances via Coincidence Techniques" C. Rowland, C. Iliadis, A.E. Champagne, A.K. Dummer, R. Fitzgerald, E.C.T. Harley, J. Mosher, and R. Runkle, Nucl. Instr. Meth. **A480** 610 (2002).
3. "Measurements of Solar Fusion Reactions", Invited talk given at the Fall Meeting of the APS Div. of Nucl. Phys., East Lansing (2002).
4. "Direct Measurement of the ^{14}N(p,γ)^{15}O S-Factor" R.C. Runkle, A.E. Champagne, C. Angulo, C. Fox, C. Iliadis, R. Longland, and J. Pollanen, to be published in Phys. Rev. Lett.

Collaborators: listed above in publications
Graduate advisor: Prof. P.D. Parker, Yale University
Postdoctoral advisor: Prof. G.D. Sprouse, SUNY Stony Brook

Postdoctoral advisees: D. Visser 2003-present, C. Fox 2001-2004, L. Sahin 2001-2002, A.K. Dummer 1998-1999, D. Bardayan 1998-1999, V.Y. Hansper 1995-1998, J.C. Blackmon 1995-1996, M.A. Hofstee 1992-1995

Ph.D. students: R.C. Runkle 2003, S.E. Hale 1999, D.S. Junkin 1997, J.C. Blackmon 1994, Z.Q. Mao 1992

Lay Nam Chang

Professor of Physics

Research Area - Theoretical Physics

Educational Background

1964	A.B., Columbia College, Physics
1967	Ph.D., University of California (Berkeley), Physics

Professional Record

1967-69	Research Associate, Center for Theoretical Physics Massachusetts Institute for Technology
1969-71	Research Associate, Enrico Fermi Institute University of Chicago
1971-78	Assistant Professor of Physics University of Pennsylvania
1978-83	Associate Professor of Physics Virginia Tech
1983	Professor of Physics Virginia Tech
1995	Chair, Physics Department Virginia Tech
2002	Interim Dean, College of Arts and Sciences Virginia Tech
2003	Dean, College of Science Virginia Tech

Professional Experience

1974	Visiting Scientist, Niels Bohr Institute University of Copenhagen, Denmark
1976	Visiting Scientist, Physics Department Brookhaven National Laboratory
1982	Member, Institute for Theoretical Physics State University of New York at Stony Brook
1984	Visiting Scientist, Theory Group TRIUMF, University of British Columbia
1985	Visiting Professor, Physics Department National University of Singapore
1988	Member, Institute for Theoretical Physics University of California, Santa Barbara
1993	Technical Expert, Physics Division National Science Foundation, Washington, DC

Biographical Sketch

Martin C. Chapman
mcc@vt.edu
(540) 231-5036

Geosciences Department, 4044 Derring Hall
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0435

PROFESSIONAL PREPARATION

VPI & SU	Geophysics	B.S., 1977
VPI & SU	Geophysics	M.S., 1979
VPI & SU	Geophysics	Ph.D., 1998

PROFESSIONAL POSITIONS

Assistant Research Professor, Virginia Tech	1998-present
Research Associate, Virginia Tech	1984-1997
Seismologist, Law Engineering, Inc.	1979-1983

Research Interests: seismicity of plate interiors, strong-motion seismology, seismic hazard analysis

PUBLICATIONS

Most closely related to proposed project:

A.T. Iannacchione, A.T., G. Esterhuizen, T.S. Bajpayee, P.L. Swanson, and M.C. Chapman, (2005).Characterizing Mining Induced Seismicity Associated with Roof Falls and Roof Caving Events, 40th U.S. Rock Mechanics Symposium, June 25-29, 2005, Anchorage, Alaska (manuscript accepted).

W.-Y. Kim and M.C. Chapman (2005). The 9 December 2003, Central Virginia, Earthquake Sequence: A Compound Earthquake in the Central Virginia Seismic Zone, Bull. Seism. Soc. Am, (in press).

Chapman, M. C., C. A. Powell, G. Vlahovic and M. S. Sibol (1997), A statistical analysis of earthquake focal mechanisms and epicenter locations in the eastern Tennessee seismic zone, Bull. Seism. Soc. Am. Vol 87, 1522-1536.

Chapman, M. C., G. A. Bollinger, and M. S. Sibol, (1992), Modeling delay-fired explosion spectra at regional distances, Bull. Seism. Soc. Am., 82, pp. 2430-2447.

Chapman, M. C. and M. J. B. Rogers, (1989), Coda Q in the southern Appalachians, Geophys. Res. Letters, 16, no. 6, pp. 531-534.

Other significant publications:

Chapman, M. C., P. Talwani and R.C. Cannon (2003) Ground motion attenuation in the Atlantic Coastal Plain near Charleston, South Carolina, Bull. Seism. Soc. Am., 93, 998-1011.

Chapman, M. C. (1999), On the Use of Elastic Input Energy for Seismic Hazard Analysis, Earthquake Spectra, Vol.15, no. 4, 607-635.

Chapman, M. C., (1995), A probabilistic approach to selection of ground motions for engineering design, Bull. Seism. Soc. Am., 85, 937-942.

Chapman, M. C., G. A. Bollinger, M. S. Sibol, and D. E. Stephenson, (1990), The influence of the Coastal Plain sedimentary wedge on strong ground motions from the 1886 Charleston, South Carolina, Earthquake, Eqke. Spectra, 6, no. 4, pp. 617-640.

Chapman, M. C., J. A. Snoke, and G. A. Bollinger, (1988), A procedure for calibrating short-period telemetered seismograph systems, Bull. Seism. Soc. Am., 78, pp. 2077-2088.

Synergistic activities:

- Director, Virginia Tech Seismological Observatory (http://www.geol.vt.edu/outreach/vtso/)
- Associate Editor, ***Bulletin of the Seismological Society of America***
- Editor, Eastern Section Pages, ***Seismological Research Letters***

Collaborators and Other Affiliations:

T.S. Bajpayee, NIOSH, Pittsburgh Research Lab., Pittsburgh, PA
Richard Cannon, Department of Geosciences, University of South Carolina
G. Esterhuizen, NIOSH, Pittsburgh Research Lab., Pittsburgh, PA
A.T. Iannacchione, NIOSH, Pittsburgh Research Lab., Pittsburgh, PA
Won-Young Kim, Lamont Earth Observatory, Columbia University
P.L. Swanson, NIOSH, Spokane Research Lab., Spokane, WA
Pradeep Talwani, Department of Geosciences, University of South Carolina

Graduate advisor: Dr. G.A. Bollinger (Va Tech, retired), Dr. J. Arthur Snoke (Va Tech)

Thesis and Postdoctoral advisees:
Elige Grant (2003-present), Alanna Lester (2003-present) (both at Va Tech)
Meredith Dunn (2002-2004, now at CERI, University of Memphis)

BIOGRAPHICAL SKETCH

Gang Chen, Ph. D., P.E.
Department of Mining and Geological Engineering
University of Alaska Fairbanks
P. O. Box 755800, Fairbanks, AK 99775-5800
ffgc@uaf.edu
(907)474-6875

PROFESSIONAL PREPARATION

Ph.D. Mining Engineering, 1989, Virginia Polytechnic Institute & State University.
M.S. Mining Engineering, 1984, Colorado School of Mines.
B.S. Mining Engineering, 1977, Shandong Mining Institute.
P.E. (Professional Engineer), Mining Engineering, Registered in Alaska and Virginia

PROFESSIONAL POSITIONS

Professor of Mining Engineering, University of Alaska Fairbanks, 2002 - present
Associate Professor of Mining Engineering, University of Alaska Fairbanks, 1997 - 2002
Assistant Professor of Mining Engineering, University of Alaska Fairbanks, 1993 -1997
Researcher and Instructor, Virginia Polytechnic Institute & State University, 1991 - 1993
Research Associate, Southern Illinois University at Carbondale, 1989 – 1991
Research Assistant, Virginia Tech, 1985-1989

PUBLICATIONS (Most closely related to proposed project):

Chen, G., H. Li and X. Fang, "Probabilistic Analysis of the Occurrence of a Key Block in a Rock Excavation and Its Stability", accepted for publication, Proceedings, 40th U.S. Rock Mechanics Symposium, 2005.

Li, H., **G. Chen** and T. Zhang, "Laboratory Experiments and Computer Simulations of Ultrasonic Wave Propagation through Rock Fracture and Inhomogeneous Rock Media under Compressive Loading", accepted for publication, Proceedings, 40th U.S. Rock Mechanics Symposium, 2005.

Sun, C. and **G. Chen**, "Time-dependent Analysis of Underground Opening Stability", World Journal of Engineering, Vol. 1, No. 1, 2004, pg. 50-60.

Luo, H., W. Zhou, S. Huang and **G. Chen**, "Earthquake-Induced Stability Analysis of Las Colinas Landslide in El Salvador", Vol. 41, Issue 3 (2004), International Journal of Rock Mechanics and Mining Sciences, 2004

Li, D., **G. Chen**, G. A. Chukwu , S. Khataniar and S. L. Patil, "Laboratory Evaluation Of Chemical Grouts for Wellbore Stabilization", manuscript under review for publication in SPE Transactions, 2004.

Chen, G. and S. Huang, "Analysis of Ground Vibrations Caused by Open Pit Production Blasts - A Case Study", FRAGBLAST - International Journal for Blasting and Fragmentation, Vol. 5, No. 1-2, 2001, pg. 91-107.

Sun, C., D. Later and **G. Chen**, "Analysis of the Effect of Borehole Size on Explosive Energy Loss in Rock Blasting", FRAGBLAST - The International Journal for Blasting and Fragmentation, Vol. 5, No. 4, 2001, pg. 235-246.

Chen, G. and C. Sun, "Numerical Simulation of Yield Pillar Behavior with Creep Material Model", SME Transactions, Vol 308, 2000, pp. 65-68.

Chen, G., J. Ke, Z. Jia, and W. Wang, "Probabilistic Analysis of Rock Slope Stability with First-Order Second-Moment Approximation", International Journal of Surface Mining and Reclamation, Vol. 12, No. 1, 1998, pg.11-17.

Chen, G., Z. Jia and J. Ke, "Probabilistic Analysis of Underground Excavation Stability", International Journal of Rock Mechanics and Mining Sciences, Vol. 34, No. 3-4, 1997, pg. 665.

Chen, G., "Stochastic Modeling of Rock Fragment Flow under Gravity", International Journal of Rock Mechanics and Mining Sciences, Vol. 34, No. 2, 1997, pp. 323-331.

Chen, G., and Y. P. Chugh, "Estimation of In-situ Viscoelastic Parameters of Weak Floor Strata by Plate Loading Tests", Journal of Geotechnical and Geological Engineering,, Vol. 14, 1996, pp. 151-167.

SYNERGISTIC ACTIVITIES

Regularly Teach Engineering Mechanics, Rock Mechanics, Advanced Rock Mechanics and Rock Blasting courses at both undergraduate and graduate levels
US Rock Mechanics Symposium 2005, Organizing Committee Chair, 2004-2005
University of Alaska Fairbanks Summer Research Academy, Instructor, 2002
University of Alaska Fairbanks Rock Mechanics Lab Digital Control and Data Acquisition System Development, 1999-2001
Society of Mining, Metallurgy and Exploration, Underground Mining Committee Chairman, 1998-1999

COLLABORATORS AND OTHER AFFILIATIONS

Collaborators: (Outside of the University of Alaska Fairbanks)

James Bush, Pacific NW National Lab
Jeffrey C. Dawson, BJ Services
Robert Hunter, BP Exploration Alaska
Pete McGrail, Pacific NW National Lab
Arun Wagh, Argonne National Lab

Graduate Advisor

Dr. Michael Karmis – Virginia Polytechnic Institute and State University

Thesis Advisees

Hui Lee, University of Alaska Fairbanks
Shirish Patil, University of Alaska Fairbanks
Qing Lin, University of Minnesota
Chi Wang, Unknown Affiliation
En Xie, Unknown Affiliation
Dewen Li, Unknown Affiliation
Changshou Sun, University of Utah
Zhihong Jia, Unknown Affiliation
Wenzhou Wang, Sun Microsystem

Biographical Sketch

John Alan Chermak
Environmental Geochemist, Instructor
Department of Geological Science
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061
jchermak@vt.edu
Phone - 540-951-8444 **Cell –** 540-230-2183

Professional Positions
1984: Geochemist, United States Geological Survey, Reston, VA
1984–1988: Teaching and Research Assistant, VPI&SU
Summer 1988: Geochemist, ARCO Oil & Gas Company, Plano, TX
1988–1989: Research Assistant, Virginia Polytechnic Institute & State University
1990–1993: Post Doctoral Research Assistant, University of Bern, Switzerland
1993–1994: Assistant Professor, Department of Geology, Georgia State University
1994–6/2003: Senior Geochemist, Project Manager and Staff Manager, MFG/Shepherd Miller, Inc., Fort Collins, CO
6/2003–present: Senior Geochemist/Environmental Consultant
1/2004-present: Instructor of Geology, Environmental Geochemistry, Virginia Polytechnic Institute & State University, Blacksburg, Virginia

Education
B.S., Geochemistry and Geophysics, Bowling Green State University, Bowling Green, OH, May 1984, Senior thesis title: Multivariate Statistical Analysis of Interstitial Water in the Chesapeake Bay
M.S., Geology, Geochemistry emphasis, Virginia Polytechnic Institute and State University, Blacksburg, VA, July 1986, Thesis title: The Rates of Oxidation of Galena and Sphalerite in Acidic Ferric Chloride Solutions
Ph.D., Geology, Geochemistry emphasis, Virginia Polytechnic Institute and State University, December 1989, Dissertation title: The Kinetics and Thermodynamics of Clay Mineral Reactions

Memberships, Professional Registrations, Awards, Short Courses
The Geochemical Society**,** Professional Geologist, Wyoming and Virginia**,** Acid Drainage Technology Initiative Member, Integrated Mining and Land Reclamation Planning Short Course, 1997, 1999, 2001, Acid Rock Drainage, Reno, Nevada

Professional Interests
Environmental geochemistry: identifying water quality controlling geochemical reactions in many different geologic settings
Applied Geochemistry: Geochemical and hydrologic characterization of mining and industrial sites related to environmental remediation
Water treatment: nucleation and growth of secondary precipitates

Publications closely linked to this project:

Hannula, S.R., K.J. Esposito, J.A. Chermak, D.D. Runnells, D.C. Keith, and L.E. Hall. 2003. "Estimating groundwater discharge by hydrograph separation, Iron Mountain, CA." Groundwater, vol. 41, No. 3, pp. 368-375.

Dove, P.M. and J.A. Chermak. 1994. "Mineral Water Interactions: Fluid Cell Applications of Scanning Force Microscopy." CMS Workshop Lectures, vol. 7.

Chermak, J.A. 1992. "Low Temperature Experimental Investigation of the Effect of High pH NaOH Solutions on the Opalinus Shale, Switzerland." Clays and Clay Minerals, vol. 40, pp. 650–658.

Chermak, J.A. and J.D. Rimstidt. 1990. "The Hydrothermal Transformation Rate of Kaolinite to Muscovite/Illite." Geochimica Cosmochimica Acta, vol. 54, pp. 2979–2990.

Chermak, J.A. and J.D. Rimstidt. 1989. "The Estimation of Thermodynamic Properties (delta Gf° and delta Hf°) of Silicate Minerals at 298 K from the Sum of Polyhedral Contributions." American Mineralogist, vol. 74, pp. 1023–1031.

Other significant publications:

Chermak, J.A., B. Wielinga, G. Wyatt, and J. Taylor. 2004. "Cost-effective metals removal from a large mining-impacted watershed in South-Eastern Tennessee." The American Society of Mining and Reclamation. Morgantown, WV

Keith, D.C., D.D. Runnells, K.J. Esposito, J.A. Chermak, D.B. Levy, S.R. Hannula, M. Watts, and L. Hall. 2001. "Geochemical models of the impact of acidic groundwater and evaporative salts on Boulder Creek at Iron Mountain, California." Applied Geochemistry, vol. 16, pp. 947-961.

Chermak, J.A. and D.D. Runnells. 1997. "Development of Chemical Caps in Acid Rock Drainage Environments." Mining Engineering, June, 5 pp.

Rimstidt, J.D., J.A. Chermak, and P.M. Gagen. 1994. "Rates of Reaction of Galena, Sphalerite, Chalcopyrite, and Arsenopyrite with Ferric Iron in Acidic Solutions." Environmental Geochemistry of Sulfide Oxidation, ACS Symposium #550, pp. 2–13.

Chermak, J.A. 1993. "Low Temperature Experimental Investigation of the Effect of High pH KOH Solutions on the Opalinus Shale, Switzerland." Clays and Clay Minerals, vol. 41, pp. 365–372.

Recent collaborators

Wielinga, Bruce
Runnells, Don
Lander, Rob

PhD Advisor

Rimstidt, J. D.

KIMBERLY L. DAVIS, P.E.
Center for Environmental Biotechnology, University of Tennessee
Suite 311 Conference Center Building, Knoxville, Tennessee 37996-4134
Office: (865) 974-1847, Fax: (865) 974-1838, Email: kdavis17@utk.edu

A. PROFESSIONAL PREPARATION
Clemson University, Clemson, South Carolina, Chemical Engineering, B.S. 1984
Clemson University, Clemson, South Carolina, Environmental Systems Engineering, M.S. 1988
University of Tennessee, Knoxville, Tennessee, Sociology (Ph.D. student)

B. PROFESSIONAL EXPERIENCE
1994-present, Senior Research Associate, Center for Environmental Biotechnology, University of Tennessee
1990-1995, Senior Environmental Engineer, International Waste Management Systems, Knoxville, Tennessee
1988-1990, Environmental Engineer, Parsons Engineering-Science, Oak Ridge, Tennessee
1986-1988, Environmental Engineer, Bechtel Environmental Inc., Oak Ridge, Tennessee

C. PUBLICATIONS

1. Mary E. Rogge, Kimberly L. Davis, Deborah N. Maddox, and Milton Jackson, "Leveraging Environmental, Social, and Economic Justice at Chattanooga Creek: A Case Study," Journal of Community Practice, 13(3), 2005

2. M. Swanson, A. Weissman, G. Davis, M.L. Socolof, and K. Davis, "Developing priorities for greener state government purchasing: A California case study," Journal of Cleaner Production, 13(7), June 2005.

3. Davis, Kimberly L. and Maria L. Socolof, "State of California Guidelines for Procurement, Use and End-of-life Management of Electronic Equipment," California Department of General Services 4-01-03-0005A, May 2003.

4. Coleman, K.M., J.R. Nolan, K.L. Davis, T.J. Phelps, T.L. Kieft, E. van Heerden, D. Litthauer and S.M. Pfiffner. 2002. U.S./South African Undergraduate Education and Research Workshop. Fall 2002 Annual American Geophysical Union Meeting. San Francisco, CA.

5. Davis, K.L. and C. Bolton. 1999. Reducing Costs of UST Site Management Using a RBCA Strategy. ASCE Practice Periodical of Hazardous, Toxic and Radioactive Waste Management. April, pp. 94-100.

6. Sayler, G.S., J. Sanseverino, and K.L. Davis. 1997. Proceedings of Biotechnology in the Sustainable Environment Symposium. Plenum Press, New York, NY.

D. SYNERGISTIC ACTIVITIES
1. Co-PI on NASA-funded Indiana-Princeton-Tennessee Astrobiology Institute team, one of the 12 teams joining the NASA Astrobiology Institute (NAI), a national and international research consortium that studies the origin, evolution, distribution and future of life on Earth and in the universe. UT's role in this project will focus on the education and outreach components of the team's research on subsurface microbial communities (2003-2008).

2. Co-PI on NSF-funded Research Experience for Undergraduates (REU) site called "Biogeochemical Educational Experiences - South Africa," 2003-2004. This is a seven-week summer research program held at the University of Free State in Bloemfontein, S.A., and provides an opportunity for undergraduates to engage in hypothesis-driven and interdisciplinary research of the unusual geochemical and microbial environments that exist within S.A. gold mines. This REU expands on two NSF-funded week-long workshops for undergraduates held in 2001 and 2002.

3. PI on several Green Seal research projects (2001-present) which provide technical assistance to all levels of government in their purchasing, operations, and facilities management to incorporate environmentally-preferable practices and co-author of several *Choose Green Reports* which identify environmental screening criteria and make recommendations for environmentally-preferable consumer products that meet these standards.

4. Co-researcher with Dr. Mary Rogge (Associate Professor, College of Social Work) on Leveraging Environmental, Social, and Economic Justice at Chattanooga Creek: A Case Study, which examined the impact of environmental contamination and perceived risk on social and economic development and empowerment in the Alton Park neighborhood in Chattanooga. Using data from repositories at the Chattanooga Institute, TDEC, ATSDR and EPA Region IV, as well as oral histories, this research documented lessons learned about community participation, resilience, and the importance of evaluating the outcomes of intervention by outside agencies and organizations. Funded by UT WMREI.

E. Collaborators & Other Affiliations

(i) PI-level Collaborators and Co-authors - Barkenbus J., University of Tennessee (UT), Energy, Environment and Resources; Sayler, G.S., UT Center for Environmental Biotechnology; Pfiffner, S., UT Center for Environmental Biotechnology; Onstott, T.C., Princeton University, Department of Geosciences; Wessman, A., Green Seal, Inc.; Rogge, M., UT Department of Social Work; Russell, M., University of Tennessee, Joint Institute of Energy and Environment; Hyfantis, G., Environmental Systems Corporation, Knoxville, Tennessee; Reed, G.D., University of Tennessee, Department of Civil and Environmental Engineering; Bolton, C., Concord Environmental Services, Concord, Tennessee; Markland-Day, S., Bay Area Bio Science Center, San Francisco, CA; Kato, K., Canon Corporation, Kanagawa, Japan

(ii). **Graduate and Post Doctoral Advisors** – Cable, S., University of Tennessee

(iii). **Thesis Advisor and Postgraduate-Scholar Sponsor -** Grady, C.P.L., Clemson University

Emmanuel Detournay: Curriculum Vitae

Emmanuel Detournay, Professor
Department of Civil Engineering
University of Minnesota
E-mail: detou001@tc.umn.edu

Education

1983	Ph.D., Geo-Engineering, University of Minnesota
1979	M.S., Geo-Engineering, University of Minnesota
1976	Ingénieur Civil des Mines, University of Liège, Belgium

Research Specialties

Mechanics of fluid-infiltrated solids (thermoporoelasticity), mathematical modeling of hydraulic fractures, mechanics of tool-rock interaction (rock cutting, indentation).

Professional Employment

1999-	Professor, Department of Civil Engineering, University of Minnesota
1993-99	Associate Professor, Department of Civil Engineering, University of Minnesota
1990-92	Senior Research Scientist, Schlumberger Cambridge Research, Cambridge, UK
1989	Research Scientist, Schlumberger Cambridge Research, Cambridge, UK
1986-88	Research Scientist, Dowell-Schlumberger, Tulsa, Oklahoma
1985-86	Senior Research Engineer, Dowell-Schlumberger, Tulsa, Oklahoma
1983-85	Rock Mechanics Analyst, Agbabian Associates, El Segundo, California

Recent Professional Activities

2002-2003	Member of Igneous Consequences Peer Review Panel, DOE
2001-	Member of Editorial Board, Int. J. Num. and Anal. Methods in Geomechanics
2002-	Visiting Scientist, CSIRO, Australia (Summer appointment)
1999-2001	Member, U.S. National Committee for Rock Mechanics
1999-	Member of the Editorial Board, Revue Française de Géotechnique
1998	Guest Co-Editor, Special Issue of the International Journal of Solids and Structures: Poroelasticity, Maurice A. Biot Memorial Issue, Vol. 35, No 34-35, 1998.
1998-	Member of the Editorial Board, Int. J. Rock Mechanics and Mining Sciences
1996-2001	Member of Advisory Board, Mechanics of Cohesive-Frictional Materials
1996-99	Member, International Geomechanical Commission (an indepenent commission established to assess the short- and long-term effects of underground nuclear testing on the stability and hydrology of Mururoa and Fangataufa in French Polynesia)

Awards

1997-	Corresponding Member, Russian Academy of Natural Sciences
1994	Basic Research Award, U.S. National Committee for Rock Mechanics, National Academy of Sciences
1987	Technical Achievement Award, Dowell-Schlumberger (for work on Poroelasticity)
1984	Scientific Award from AILg (“Prix Scientifique de l'AIlg”), Association of Engineers of University of Liege for Ph.D. thesis (Diploma and cash prize)

1977 Clement Guion Award, University of Liège (Engineering thesis; medal and cash prize)

Publications (related to project)

1. E. Detournay (2004), Propagation Regimes of Fluid-Driven Fractures in Impermeable Rocks, *Int. J. Geomechanics,* Vol 4, No 1, pp. 35-45.
2. A. Savitski and E. Detournay (2002), Propagation of a Penny-Shaped Fluid-Driven Fracture in an Impermeable Rock: Asymptotic Solutions, *Int. J. Solids Structures,* Vol 39, No 26, pp. 6311-6337.
3. X. Zhang, E. Detournay, and R. Jeffrey (2002), Propagation of a Penny-Shaped Hydraulic Fracture Parallel to the Free-Surface of an Elastic Half-Space, *Int. J. Fracture, ,* Vol 115, pp. 125-158 .
4. J. Adachi and E. Detournay (2002), Self-Similar Solution of a Plane-Strain Fracture Driven by a Power-Law Fluid, *Int. J. Num. Anal. Methods in Geomechanics,* Vol 26, pp. 579-604..
5. D. Garagash and E. Detournay (2000) The tip region of a fluid-driven fracture in an elastic medium, *J. Appl. Mech*, Vol. 67, March, pp. 183-192.

Publications (others)

1. E. Detournay and D. Garagash (2003), The tip region of a fluid-driven fracture in a permeable elastic medium, *Journal of Fluid Mechanics*, **494**, 2003, pp. 1-32.
2. D. Garagash and E. Detournay (2002), Viscosity-dominated regime of a fluid-driven fracture in an elastic medium. In B.L. Karihaloo, editor, *IUTAM Symposium on Analytical and Computational Fracture Mechanics of Non-Homogeneous Materials*, series: Solid Mechanics and Its Applications, Vol. 97, Kluwer Academic Publishers.
3. E. Detournay (1999), Fluid and solid singularities at the tip of a fluid-driven fracture, in *Non-Linear Singularities in Deformation and Flow* (IUTAM Symposium, Technion, Haifa, March 1997), D. Durban and J.R.A. Pearson, Editors, pp. 27-42, Kluwer Academic Publishers, The Netherlands
4. R. Carbonell, J. Desroches, and E. Detournay (1999), A comparison between a semi-analytical and a numerical solution of a two-dimensional hydraulic fracture, *Int. J. Solids Structures*, Vol. 36, pp. 4869-4888.
5. J. Desroches , E. Detournay, B. Lenoach, P. Papanastasiou, J.R.A. Pearson, M. Thiercelin, A. Cheng (1994), The crack tip region in hydraulic fracturing, *Proc. Roy. Soc. London*, Vol 447, pp. 39-48

Collaborators: Prof. A. H.-D. Cheng, Prof. A. Drescher, Prof. I. Vardoulakis, Prof. C. Atkinson, Prof. J.R.A. Pearson, Prof. J. Hudson, Dr. R. Jeffrey, Dr, X. Zhang

Past Advisees: (i) Ph.D.: R. Carbonell, I. Berchenko, D. Garagash, H. Huang, A Savitski, S. Mitain, T. Richard, J. Adachi, G. Capasso; (ii) MSc: T. Lhomme, F. Dagrain, C. Germay, M. Madyarova

Advisors: Prof. C. Fairhurst, Dr. M. Hardy

Synergetic Activities

2003 Organizer of a workshop on the modeling of fluid-driven fractures (Wisconsin)
2001 Co-organizer of a workshop on hydraulic fracturing (Washington, DC)
1998 Guest Co-Editor, Special Issue of the International Journal of Solids and Structures: Poroelasticity, Maurice A. Biot Memorial Issue, Vol. 35, No 34-35, 1998.

Joseph E. Dove
Virginia Tech
Department of Civil and Environmental Engineering
200 Patton Hall
Blacksburg, Virginia 24061

Professional Preparation

Georgia Tech Civil Engineering, Ph.D., 1996.
Virginia Tech Civil Engineering, M.S., 1986.
Virginia Tech Soil Science, B.S., 1980.

Professional experience

Research Assistant Professor, Virginia Tech, 2000 – present.
Research Engineer, Georgia Tech, 1996 – 2000.
Staff Engineer to Project Engineer/Manager, Woodward-Clyde Consultants, New York Metropolitan and San Francisco Bay Area Offices, 1986 – 1993.
Soil Scientist, Virginia Cooperative Soil Survey, 1980 – 1982.

Research interests

Strain measurements on geotechnical systems
Visualization and image analysis
Mechanics and behavior of geotechnical interphases

Selected research publications

Mauldon, M., Dove, J.E., Gutierrez, M., Westman, E., Burbey, T, Bodnar, R., Vogelaar, B. "Geoengineering Research for a Deep Underground Science and Engineering Laboratory in Sedimentary Rock." *American Geophysical Union*, San Francisco, California, December 2005 (abstract).

Wang, J., Dove, J.E. Gutierrez, M. and Corton, J.D., In review. "Strain localization during shear of an idealized interphase system." *Mechanics and Materials Conference 2005,* Baton-Rouge, LA, June, 2005.

Dove, J.E., Wang, J., Gutierrez, M.S., Corton, J.D., In review. "Shear deformation in the interphase region." *Powders and Grains 2005*, Stuttgart, Germany, July 2005.

Wang, J., Gutierrez, M., and Dove, J.E., 2004. "Effect of Particle Rolling Resistance on Interface Shear Behavior". *Proceedings 17th ASCE Engineering Mechanics Conference,* Newark, Delaware.

Dove, J.E. and Jarrett, B.J., 1999. "Friction Behavior of Granular Materials on Ideal Counterfaces". Proceedings: "*Friction on the 300th Anniversary of Amontons' Law"*, San Jose, CA, June 1999. Materials Research Society, pp. 29-31.

Other Publications

Giroud, J.P., Palmer, B., and Dove, J.E., 2000. "Calculation of Flow Velocity in Pipes as a Function of Flow Rate". Geosynthetics International, Vol. 7, Nos. 4-6, pp. 583-600.

Pando, M.A., Filz, G.M. and Dove, J.E. 2002. "Interface Shear Tests on FRP Composite Piles". Accepted for publication in the *Proc. of the International Deep Foundations Congress* - Orlando, Florida, February 14-16.

Dove, J.E., Frost, J.D., Han, J., and Bachus, R.C., 1997. "The Influence of Geomembrane Surface Roughness on Interface Strength". *Proc. of Geosynthetics '97*, North American Geosynthetics Society, Long Beach, California, pp. 863-876.

Dove, J.E. and Frost, J.D., 1996. "A Method for Estimating Geomembrane Surface Roughness". *Geosynthetics International,* Vol. 3, No. 3, pp. 369-392.

Dove, J.E., Frost, J.D. and Dove, P.M., 1996. "Geomembrane Microtopography by Atomic Force Microscopy". *Geosynthetics International*., Vol. 3, No. 2, pp. 227-245.

Recent collaborators

Dr. Marte Gutierrez, Virginia Tech, Blacksburg, Virginia
Dr. Matthew Mauldon, Virginia Tech, Blacksburg, Virginia
Dr. Eric Westmann, Virginia Tech, Blacksburg, Virginia
Dr. Doug Bowman, Virginia Tech, Blacksburg, Virginia
Mr. Matt Adams, GSE Lining Technology, Inc., Houston, Texas.
Dr. Robert Bachus, GeoSyntec Consultants, Atlanta, Georgia.
Dr. J. David Frost, Georgia Institute of Technology, Atlanta, Georgia
Dr. J.P. Giroud, Chairman Emeritus, GeoSyntec Consultants, Boca Raton, Florida.
Dr. Jie Han, University of Kansas.
Dr. James Long, Department of Civil Engineering, University of Illinois.
Mr. John Luellen, URS Corporation, Niagara Falls, NY.
Mr. Robert Swan, Soil and Geosynthetic Interaction, Inc., Norcross, Georgia.

Graduate advisors

M.S. Advisor: Professor J.M. Duncan, Virginia Tech, Blacksburg, Virginia
Ph.D. Advisor: Professor J.D. Frost, Georgia Institute of Technology, Atlanta, Georgia

Undergraduate and graduate students advised

Mr. Jesse Darden, M.S.
Mr. Alfred Antony, M.S./Ph.D.
Ms. Dan McGough, M.S.
Ms. Jessa Corton, Undergraduate.
Ms. Genevieve Smith, Undergraduate.
Mr. Jeff Wang, Ph.D.
Mr. Andy Schwaiger, M.S.
Ms. Valerie Zofchack, M.S.
Mr. Andrei Ramniceanu, Undergraduate.
Mr. Duane Bents, M.S.
Mr. Ian Chaney, M.S. (with George Filz).
Mr. Bo Gao, Ph.D.
Mr. Lee Johnson, M.S.
Ms. Lois Boxill, M.S.
Mr. Bradley Jarrett, Undergraduate
Ms. Sena Okudezeto, M.S.

VITA - DEREK ELSWORTH

Address: Department of Energy and Geo-Environmental Engineering
Pennsylvania State University, University Park, PA 16802
Electronic: +1 814 865-2225 (Phone) +1 814 865-3248 (Fax)
elsworth@psu.edu www.egee.psu.edu/Faculty/elsworth.htm

PROFESSIONAL PREPARATION

Portsmouth Polytechnic, England	Engineering Geology	B.Sc.(Hons.)	1979
Imperial College, London	Engineering Rock Mechanics	M.Sc., D.I.C.	1980
University of California, Berkeley	Engineering	Ph.D.	1984

PROFESSIONAL DETAILS

1997 - Pres.	Professor, Energy and Geo-Environmental Engineering, Pennsylvania State University.
2000 - 2003	Associate Dean for Research, College of Earth & Mineral Sciences, Penn State Univ.
1991 - 1997	Associate Professor, Mineral Engineering, Pennsylvania State University.
1985 - 1991	Assistant Professor, Mineral Engineering, Pennsylvania State University.
1990 - 1993	Adjunct Professor, Earth Sciences and WCGR, University of Waterloo.
1984 - 1984	Visiting Assistant Professor, Civil Engineering, University of Toronto.
1984	Research Associate, Lawrence Berkeley Laboratory.
1980 - 1982	Engineer D.R. Piteau and Assocs., and Komex Consultants. Calgary, Canada.

Total Publications: 130. **Total Peer-reviewed**: 75. **Books**: 1 (& 1 edited proceedings)

CURRENT INTERESTS

Derek Elsworth has expertise in the areas of computational mechanics, flow and transport in porous media and rock mechanics, with application to geothermal energy, the deep geological sequestration of radioactive wastes and of CO_2 and the behavior of fractured reservoirs and aquifers, in general. He has served as a consultant on underground science to Golder Associates, PNC (Japan), DoE, NIOSH, NRC, and NWTRB. He is the 1987 recipient of the Manuel Rocha Medal of the International Society for Rock Mechanics.

SYNERGISTIC ACTIVITIES

- Recent Underground Science-Related Activities: Yucca Mountain Project-related advisory activities: CNWRA-SWRI program review (1995); Report to NRC-ACNW on coupled-processes (1996); DoE Near-Field/Altered-Zone Expert Elicitor (1997-1998); NRC-NWTRB Consequences of Igneous Intrusion at Yucca Mountain (2001-present); NRC-ACNW on Consequences of Ingeous Intrusion at YMP.
- DUSEL-Related Activities: Presenter at NSF-ARMA workshop (Washington, October, 2002); Presenter NSF-NESS Workshop (Washington, October, 2002); Co-principal author of ARMA-Underground Science and Engineering Report (May 2003); Co-Author of NSF EarthLab Report (June, 2003; www.earthlab.org); Convener of NSF-ARMA workshop on Underground Science, concurrent with International Congress of ISRM (Johannesburg, September, 2003); Plenary speaker 1st DUSEL Workshop (Berkeley, August, 2004); S-1 Proposal Participant and S-1 Working Group Leader for Infrastructure.
- Recent keynote presentations: IAVCEI Conference on Explosive Volcanism, Martinique (2002); DoE Workshop on Engineered Geothermal Ssytems, US R.Mech. Symp, MIT (2003); GeoProc2003 – Int. Conf. on Coupled T-H-M-C Processes in GeoSystems, Stockholm (2003), and Euro Conference on Rock Physics and Geomechanics, Berlin (2004).

PUBLICATIONS RELEVANT TO PROPOSAL

1. Yasuhara, H., Marone, C., and Elsworth, D. (2005) Fault zone restrengthening and frictional healing: the role of pressure solution. In press. J. Geophys. Res. 39 pp.

2. Polak, A., Elsworth, D., Liu, J., and Grader, A. (2004) Spontaneous switching of permeability changes in a limestone fracture under net dissolution. Water. Resour. Res., Vo. 40, W03502, doi:10.1029/2003WR002717.

3. Yasuhara, H., Elsworth, D., and Polak, A. (2004) The evolution of permeability in a natural fracture: the significant role of pressure solution. J. Geophys. Res., Vol. 109, B03204, doi:10.1029/2003JB002663.

4. Yasuhara, H., Elsworth, D., and Polak, A. (2003) A mechanistic model for compaction of granular aggregates moderated by pressure solution. J. Geophys. Res. *108*(B11), 2530.

5. Polak, A., Elsworth, D., Yasuhara, H., Grader, A.S., and Halleck, P.M. (2003) Permeability reduction of a natural fracture under net dissolution by hydrothermal fluids, Geophys. Res. Lett., 30(20), 2020.

OTHER SIGNIFICANT PUBLICATIONS

1. McPherson, B.J., Elsworth, D., Fairhurst, C., Kessler, S., Onstott, T..C., Roggenthen, W., and Wang, H. EarthLab Steering Committee. EarthLab: A Subterranean Laboratory and Observatory to Study Microbial Life, Fluid Flow, and Rock Deformation, Geosciences Professional Services, Inc., June 2003, 64 pp. [www.earthlab.org].

2. Elsworth, D. and Fairhurst, C. Engineering Research Opportunities in the Subsurface: Geo-Hydrology and Geo-Mechanics. Summary Report to NSF on the proposed National Underground Science and Engineering Laboratory (NUSEL). May, 2003.

3. *Rock Mechanics in the National Interest*, Proceedings of the 38th U.S. National Symposium on Rock Mechanics, Editors. D. Elsworth, J.P. Tinucci, and K.A. Heasley, July 7-10, 2001, Washinton, D.C. A.A. Balkema Publishers. 1565 pp.

4. Bai, M. and Elsworth, D. (2000) *Coupled Processes in Subsurface Deformation, Flow and Transport*. ASCE Press. 336 pp.

5. *Large Deformation and Flank Instability of Oceanic Island Volcanoes: A Comparison of Hawaii with Atlantic Island Volcanoes*. Editors. D. Elsworth, J.-C. Carracedo, and S.J. Day. 1999. Special Issue of the J. Volc. and Geotherm. Res., 94:1-4, 200 pp.

ASSOCIATED RESEARCHERS (previous 48 months)

M. Bai (TerraTek), S. Brantley (PSU), J. Cherry (UWaterloo), B. Brady (UWA), S. Day (UCL), P. Dunkley (MVO), M. Edmunds (MVO), C. Fairhurst (UM), P. Flemings (PSU), A. Grader (PSU), R. Herd (MVO), P. Halleck (PSU), T. Krauthammer (PSU), A. Linde (CIW), J. Liu (UWA), P. Malin (Duke), C. Marone (PSU), M. Maslin (UCL), G. Mattioli (UArkansas), F. Meng (OU), Y. Mitani (Kyushu), H. Muhlhaus (UQ), J. Neuburg (Leeds), A. Nyblade (PSU), A. Piggott (CCIW), A. Polak (Technion), J.C. Roegiers (UO), S. Sacks (CIW), T. Scott (OU), E. Shalev (Duke), S. Sparks (Bristol), G. Thompson (MVO), J. Tinucci (PanTechnica), S. Vinciguerra (UCatania), B. Voight (PSU), A. Whittle (MIT), S. Young (PSU), M. Zamman (OU).

POSTDOCTORAL RESEARCHERS (Since 1996)

O. Zhihua (Wuhan), C. Widiwijayanti (PSU), F. Donnadieau (Clermont-Ferrand), A. Polak (Technion), S. Young (PSU).

GRADUATE STUDENTS (Since 1996)

Jishan Liu (M.S. 1994;Ph.D. 1996); Shichang Zhao M.S. 1994; Ph.D. 1998); Leonid Entov (M.S. 1994; Ph.D. 1996); Biman Sadhu (M.S.1997); Hui Zhu (M.S. 1998); Amit Sharma (M.S. 1998); Dae Sung Lee (M.S. 2001, Ph.D. 20XX); Hui Long (M.S. 2002); Hide Yasuhara (Ph.D. 20XX); John Simmons (M.S. 2003); Kritika Trangoolam (M.S. 2005)

GRADUATE ADVISORS: John W. Bray (Imperial College) and Richard E. Goodman (UC, Berkeley).

Biographical Sketch

Alfredo Galindo-Uribarri Physics Division
uribarri@mail.phy.ornl.gov Oak Ridge National Laboratory
(865) 574-6124 Oak Ridge, TN 37831-6328

PROFESSIONAL PREPARATION

UNAM	Physics	B.S., 1981
University of Toronto	Physics	M.Sc., 1985
University of Toronto	Physics	Ph.D., 1991

PROFESSIONAL POSITIONS

Research Scientist, ORNL, Oak Ridge	1997-present
Research Scientist, AECL, Chalk River	1995-1997
Research Fellow, AECL, Chalk River	1991-1995

RESEARCH INTERESTS: nuclear physics, radioactive ion beams physics, accelerator mass spectrometry, and nuclear instrumentation.

SELECTED PUBLICATIONS (from 171 refereed publications; 160 in journals and 11 in conference proceedings)

1. "B(E2) measurements for radioactive neutron-rich Ge isotopes: Reaching the N = 50 closed shell", E. Padilla-Rodal, A. Galindo-Uribarri, C. Baktash, J. C. Batchelder, J. R. Beene, R. Bijker, B. A. Brown, O. Casta˜nos, B. Fuentes, J. Gomez del Campo, P. A. Hausladen, Y. Larochelle, A. F. Lisetskiy, P. E. Mueller, D. C. Radford, D. W. Stracener, J. P. Urrego, R. L. Varner, and C.-H. Yu, Phys. Rev. Lett. (2005) in press.
2. "Decay of a Resonance in ^{18}Ne by the Simultaneous Emission of Two Protons" J.Gomez del Campo, A.Galindo-Uribarri, J.R.Beene, C.J.Gross, J.F.Liang, M.L.Halbert, D.W.Stracener, D.Shapira, R.L.Varner, E.Chavez-Lomeli, M.E.Ortiz, Phys.Rev.Lett. **86**, 43 (2001).
3. "The $^{12}CH_2^{+2}$ Molecule and Radiocarbon Dating by Accelerator Mass Spectrometry" Nucl. Instr. and Meth. **B5**(1984)208, H.W. Lee, A. Galindo-Uribarri, K. H. Chang and A. E. Litherland.
4. "A Smoothly Terminating Rotational Band in ^{64}Zn" A. Galindo-Uribarri, D.Ward, G.C. Ball, V.P.Janzen, D.C. Radford, I. Ragnarsson, D .Headly Phys.Lett. **422B**, 45 (1998).
5. "Superdeformation below N=73", A. Galindo-Uribarri, S.M. Mullins, D. Ward, M. Cromaz, J. DeGraaf, T.E. Drake, S. Flibotte, V.P. Janzen, D.C. Radford and I. Ragnarsson. Phys. Rev. **54**(1996)R454.
6. "^{10}C superallowed branching ratio and Cabibbo-Kobayashi-Maskawa matrix unitarity", G. Savard, A. Galindo-Uribarri, E. Hagberg, J.C. Hardy, V.T. Koslowsky, D.C. Radford and I.S. Towner, Phys. Rev. Lett. **74,** 1521(1995).
7. "A Thin Plastic Scintillator Time-Zero Detector And Flux Monitor", A. Galindo Uribarri, T.E. Drake, G. Ball, N. Bray, J. Forster, E. Hagberg, D. Horn and C. Pruneau, Nucl. Instr. and Meth. **A301**,457(1991).
8 "Experiments with a 4π charged particle detector and the 8π spectrometer", A. Galindo-Uribarri, Progress in Particle and Nuclear Physics, Pergamon Press, Oxford, Vol **28**, 1992, p. 463.
9 "First Evidence For The Hyperdeformed Nuclear Shape At High Angular Momentum", A. Galindo-Uribarri, H.R. Andrews, G.C. Ball, T.E. Drake, V.P. Janzen, J.A. Kuehner, S.M. Mullins, L. Persson, D. Prevost, D.C. Radford, J.C. Waddington, D. Ward and R.A. Wyss. Phys. Rev. Lett. **71**, 231 (1993).
10. "Study of Resonant Reactions With Radioactive Ion Beams", A. Galindo-Uribarri, J. Gomez del Campo, J.R. Beene, C.J. Gross, J.F.Liang, S.D. Paul, D. Shapira, D.W. Stracener, R.L. Varner, E. Chavez, A. Huerta, M.E. Ortiz, E. Padilla, S. Pascual, Nucl.Instrum.Meth. **B 172** (2000) 647.

SYNERGISTIC ACTIVITIES:

- Elected member of the Gammasphere Users Executive Committee
- Established a program for selected graduate summer students since 1999 with the DNP of the Mexican Physical Society.
- Chair of the ORNL Physics Division Seminars and Colloquia since April 2003
- Organized the World Year of Physics 2005 Distinguished Lectures at ORNL

Collaborators and Other Affiliations:

COULEX:
C.J.Barton, C.Baktash, J. C. Batchelder, J.R.Beene, R. Bijker, B. A. Brown, M.A.Caprio, O. Casta˜nos, R.F.Casten, C.J.Gross, B. Fuentes, P.A.Hausladen, R.O.Hughes, A. F. Lisetskiy, E.A.McCutchan, E. Padilla-Rodal, D.C.Radford, J.J.Ressler, D.Shapira, D.W.Stracener, J. P. Urrego, C.-H.Yu., N.V.Zamfir (UNAM, MSU, Yale)

n-rich reactions: J.D.Bierman, J.Gomez del Campo, C.J.Gross, P.A.Hausladen, Y.Larochelle, J.F.Liang, W.Loveland, P.E.Mueller, D.Peterson, D.C.Radford, D.Shapira, D.W.Stracener, R.L.Varner. (Oregon)

AMS: D. Donahue, J. Doupe, B. Fuentes, J.Gomez del Campo, H. Gove, P.A.Hausladen, A.E. Litherland (Arizona, Rochester, Toronto)

Polarization: C. R. Bingham, B. van den Brandt, J. Gómez del Campo, P. Hautle, J. A. Konter, P. A. Schmelzbach, J. P. Urrego (Tennessee, Paul Scherer Institute)

^{11}C experiments: , J.Cerny, J.Gomez del Campo, Y.Larochelle, F.Liang, P.A.McMahan, J.P.O'Neil, J.Powell, D.Shapira, R.Varner, M.C.Wiescher (Berkeley, Notre Dame)

A=40 Spectroscopy: C.Andreoiu, C.Baktash, D.P.Balamuth, M.P.Carpenter, R.J.Charity, C.J.Chiara, M.Devlin, J.Eberth, C.Fahlander, P.Fallon, A.Gorgen, E.Ideguchi, R.V.F.Janssens, T.Lauritsen, D.R.LaFosse, F.Lerma, C.J.Lister, A.O.Macchiavelli, P.Reiter, W.Reviol, D.Rudolph, S.K.Ryu, D.G.Sarantites, D.Seweryniak L.G.Sobotka, Th.Steinhardt (ANL, Berkeley, Lund, Penn, Washington)

A=130 Spectroscopy: M.P.Carpenter, M.Devlin, B.G.Dong, D.J.Hartley, R.V.F.Janssens, I.Ragnarsson, L.L.Riedinger, W.Reviol, D.G.Sarantites, D.Seweryniak, O.Zeidan, J.-Y.Zhang, (ANL, Lund, Tennessee, Washington)

Graduate advisor: Prof. Tom E, Drake, University of Toronto (Ph.D.)
Prof. A.E. Litherland, University of Toronto (M.Sc.)
Postdoctoral advisor: Dr. David Ward, Chalk River (currently at Berkeley)

Thesis and Postdoctoral advisees: Araceli Ibañez 2004 – present (IF-UNAM), Juan Pablo Urrego 2002-present (U. Tennessee and PSI), E. Padilla-Rodal 2000-present (ICN-UNAM/ORNL), Yves Larochelle 2002-2003 (Laval), Paul Hausladen 2001-2003 (ORNL), Beatriz Fuentes 2001-2002 (FC-UNAM)

David P. Genereux, Associate Professor

Address and Related Information
Marine, Earth, and Atmospheric Sciences
North Carolina State University
Raleigh, NC 27695-8208

Phone: 919-515-6017
Fax: 919-515-7802
E-mail: genereux@ncsu.edu

Education
University of Delaware: Geology/Chemistry, B.S., 1984
Massachusetts Institute of Technology: Civil Engineering, M.S., 1988
Massachusetts Institute of Technology: Hydrology, Ph.D., 1991

Academic Employment
- Department of Marine, Earth, and Atmospheric Sciences, North Carolina State University, Raleigh, North Carolina (2000-present), Associate Professor
- Geology Department, and Southeast Environmental Research Center, Florida International University, Miami, FL (1997-2000), Associate Professor
- Geology Department, and Drinking Water Research Center (College of Engineering), Florida International University, Miami, FL (1992-1997), Assistant Professor
- Department of Civil Engineering, MIT, Cambridge, MA (September 1991 - February 1992), Postdoctoral Research Associate

Ten Publications Relevant to Proposal Topic
Genereux, D.P., and M.T. Jordan. 2005. Interbasin groundwater flow and groundwater interaction with surface water in a lowland rainforest, Costa Rica. Revised version submitted to *Journal of Hydrology*.

Genereux, D.P., M.T. Jordan, and D. Carbonell. 2005. A paired-watershed budget study to quantify interbasin groundwater flow in a lowland rainforest, Costa Rica. *Water Resources Research*. Accepted, in press.

Genereux, D.P. 2004. Comparison of naturally-occurring chloride and oxygen-18 as tracers of interbasin groundwater transfer in lowland rainforest, Costa Rica. *Journal of Hydrology* 295: 17-27. DOI 10.1016/j.jhydrol.2004.02.020

Saiers, J.E., D.P. Genereux, and C.H. Bolster. 2004. Influence of calibration methodology on ground-water flow predictions. *Ground Water* 42(1): 32-44.

Genereux, D.P. 2003. Comparison of methods for estimation of 50-year peak discharge from a small rural watershed in North Carolina. *Environmental Geology* 44(1): 53-58. DOI 10.1007/s00254-002-0734-5

Genereux, D.P., S.J. Wood, and C.M. Pringle. 2002. Chemical tracing of interbasin groundwater transfer in the lowland rainforest of Costa Rica. *Journal of Hydrology* 258: 163-178. DOI 10.1016/S0022-1694(01)00568-6

Genereux, D.P., and J.D.A. Guardiario. 2001. A borehole flowmeter investigation of small-scale hydraulic conductivity variation in the Biscayne Aquifer, Florida. *Water Resources Research* 37(5): 1511-1517.

Bolster, C.H., D.P. Genereux, and J.E. Saiers. 2001. Determination of specific yield for a limestone aquifer from a canal drawdown test. *Ground Water* 39(5): 768-777.

Genereux, D.P., and I. Bandopadhyay. 2001. Numerical investigation of lake bed seepage patterns: Effects of porous medium and lake properties. *Journal of Hydrology* 241(3-4): 286-303. DOI 10.1016/S0022-1694(00)00380-2

Genereux, D.P. 1998. Quantifying uncertainty in tracer-based hydrograph separations. *Water Resources Research* 34(4): 915-920.

Research interests

Hydrogeology, watershed hydrology, chemical/isotope hydrology.

Examples of Other Activities

- Associate Editor, *Water Resources Research*, 1998-2003.
- Member of NSF-supported design team for CUAHSI's prototype "hydrologic observatory", 2003-2004
- Used NSF support to develop new research infrastructure and initiate work in quantitative hydrology at La Selva Biological Station, one of the largest and most significant ecological research stations in the tropics.
- Developed hydrologic tracer methods: (1) error analysis for tracer-based water mixing calculations (Genereux 1998), and (2) use of ^{222}Rn, a radiogenic and radioactive noble gas, as a hydrologic tracer (Genereux et al. 1993, *J. Hydrol.*, 142: 167-211).
- Science Advisory Board, MacArthur Agro-Ecology Research Center, Florida, 1999-2002.
- Developed and taught grant-supported "Environmental Hydrology" course for exceptional high school juniors and seniors in Miami (classroom presentation, hands-on work with samples and maps, field trips to sites of major water resource projects).

Collaborators/Co-authors, 2000-2004 (excluding students listed below)

Carl Bolster (University of New Hampshire), Eva Bynum (American Museum of Natural History), Deborah Clark (University of Missouri), D. Reide Corbett (East Carolina University), David Eggleston (North Carolina State University, NCSU), John Fountain (NCSU), Rick Hooper (CUAHSI), Deborah Lawrence (Univ. of Virginia), Caroline Lewis (Fairchild Tropical Garden), Terrance McGlynn (U.C. San Diego), Helena Mitasova (NCSU), Steven Oberbauer (FIU), Niel Plummer (USGS), Catherine Pringle (University of Georgia), Ann Russell (Iowa State Univ.), James Saiers (Yale University), William Showers (NCSU), Marie-Louise Smith (USDA), Kip Solomon (University of Utah)

Graduate and Post-doctoral Advisor

Prof. Harold Hemond, Dept. of Civil and Environmental Engineering, MIT

Students and Post-doctoral Researchers Advised/Co-advised

Indranil Bandopadhyay (BMC Software Inc.), Kapo Coulibaly, Jose Guardiario Jr. (SFWMD), Michael Jordan (ARCADIS G&M of North Carolina), Casey Kennedy (NCSU), Scott Leahy (NCSU), Steven Memberg (USGS), Eric Slater, Matthew Webb (NCSU), Sharon Wood (Jamaican Water Resources Authority), Lynn Yuhr (Technos Inc.), Eric Zechner (University of Basel, Switzerland)

Leonid N. Germanovich

School of Civil and Environmental Engineering
Georgia Institute of Technology
Atlanta, GA 30332-0355, leonid@ce.gatech.edu, 404-894-2284

PROFESSIONAL PREPARATION

M.Sc. (includes B.Sc.), Engineering Physics (Physical Processes in Mining), 1977, *Moscow State Mining University, Moscow, Russia*
Ph.D., Engineering Sciences (Solid State Physics), 1982, *Moscow State Mining University, Moscow, Russia*
Postdoctoral Fellow, Hydrothermal Phenomena in the Earth's crust, 1990-1991, *Georgia Institute of Technology, Atlanta, Georgia*

APPOINTMENTS

Professor, 2001-present, Associate Professor, 1997-2001, *School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, Georgia*
Senior Research Scientist, Project Leader, 1991-1997, *Rock Mechanics Institute and School of Petroleum and Geological Engineering, University of Oklahoma, Norman, Oklahoma*
Rock Mechanics Research Analyst/Specialist, 1991, Yucca Mountain Project (high level radioactive waste depository), *Parsons Brinckerhoff-KBB, Las Vegas, Nevada*
Postdoctoral Fellow, 1990-1991, *School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, Georgia*
Senior Research Scientist, 1984-1989, Research Scientist, 1983-1984, *Department of Mathematical Modeling, Scotchinsky Research Institute of Mining, Russian Academy of Sciences, Moscow, Russia*
Senior Lecturer, 1984-1989, Lecturer, 1983-1984, *Department of Mathematics, College of Engineering Physics, Moscow State Mining University, Moscow, Russia*

PUBLICATION RECORD

More than 100 technical publications including 56 papers in peer reviewed journals. Ten publications most closely related to the proposed project:

1. Germanovich, L. N. and Goncharov, S. A., 2005, *Thermomechanics of Brittle Fracture*, proofing stage for transition from Gordon and Breach to Taylor and Francis, London, New York, *etc*., 805 pp.
2. Puzrin, A. M., and Germanovich, L. N., 2005, The growth of shear bands in the catastrophic failure of soils, *Proceedings of the Royal Society: Mathematical, Physical and Engineering Sciences* (in print).
3. Germanovich, L. N., and Astakhov, D. K., 2004, Fracture closure in extension and mechanical interaction of parallel joints, *Journal of Geophysical Research*, Vol. 109, No. B9, Art. B09203, 18 pp.
4. Germanovich, L. N., and Astakhov, D. K., 2004, Stress dependent permeability and fluid flow through parallel joints, *Journal of Geophysical Research*, Vol. 109, No. B2, Art. B02208, 22 pp.
5. Germanovich, L. N., Lowell, R. P., and Astakhov, D. K., 2001, Temperature-dependent permeability and bifurcations in hydrothermal flow, *Journal of Geophysical Research*, Vol. 106, No. B1, pp. 473 – 495.

6. Germanovich, L. N. and Dyskin, A. V., 2000, Fracture mechanisms and instability of openings in compression, *International Journal of Rock Mechanics and Mining Sciences*, Vol. 37, pp. 263 – 284.
7. Cherepanov, G. P. and Germanovich, L. N., 1998, Theory of catastrophes and failure criteria, Chapter 11 in *Fracture: A topical Encyclopedia of Current Knowledge Dedicated to Alan Arnold Griffith*, Krieger Publishing Co., Malabar, Florida, USA, pp. 255-274.
8. Germanovich, L. N., and Cherepanov, G. P., 1995, On some general properties of strength criteria, *International Journal of Fracture*, Vol. 71, No. 1, pp. 37 – 56.
9. Lowell, R. P., and Germanovich, L. N., 1995, Dike injection and the formation of megaplumes at ocean ridge axes, *Science*, Vol. 267, pp. 1,804 – 1,807.
10. Germanovich, L. N., and Lowell, R. P., 1992, Percolation theory, thermoelasticity, and discrete hydrothermal venting in the Earth's crust, *Science*, Vol. 255, pp. 1564 – 1567.

SYNERGISTIC ACTIVITIES AND HONORS

2003 Best Paper Award for Research in Rock Mechanics, American Rock Mechanics Association
2000 Basic Research Award for Significant Original Contributions, U.S. National Committee of Rock Mechanics and U.S. National Research Council
1996 – Foreign Fellow of Russian Academy of Natural Sciences
1995 - present, American Rock Mechanics Association
1990 - present, American Geophysical Union

POSTGRADUATE SCHOLARS

A. Balueva (*University of Georgia, Athens, Georgia*), A. Diek (*The University of Oklahoma*), P. E. Van Dyke (*Georgia Tech*), L. M. Ring (*Weatherford, Houston, Texas*)

GRADUATE STUDENTS

D. K. Astakhov (Ph.D., *Pinnacle Technologies, Bakersfield, California*), R. Chanpura (Ph.D., *Schlumberger, Houston, Texas*), H. Chang (Ph.D., *Seattle, Washington*), Y. Sim (Ph.D., *Korean Institute for Science and Technology, Korea*), K. Sriawalai (Ph.D., Thammasat University, Thailand), M. Bakala (M.Sc., *Practicing Engineer, Congo*), C. Corrigan (M.Sc., *GeoSyntec Consultants*, *Atlanta, Georgia*), V. Dubusset (M.Sc., *Practicing Engineer, France*), C. Dupont (*Practicing Engineer, France*), S. Kelleher (M.Sc., *Practicing Engineer*, Florida), R. Rostamian (*Practicing Engineer, Georgia*), K.-K. Lee (*Schlumberger, Corpus Christi, Texas*)

COLLABORATORS

L. C. Murdoch (Clemson University), A. M. Puzrin (*ETH Zurich*), R. P. Lowell (*Georgia Tech*), A. V. Dyskin (*University of Western Australia*), Z. Reches (*Hebrew University, Israel*)

GRADUATE AND POSTDOCTORAL ADVISORS:

L.V. Yershow, *Department of Mathematics, Moscow State Mining University, Moscow, Russia* (Ph.D. thesis advisor, deceased), V.M. Noskov, *Department of Rock Fracture, Moscow State Mining University, Moscow, Russia* (M.Sc. thesis advisor)

Biographical Sketch

LESLIE S. GERTSCH
GertschL@umr.edu
(573) 341-7278

Rock Mechanics and Explosives Research Center, and
Geological Sciences and Engineering Department
University of Missouri-Rolla, 1006 Kingshighway
Rolla, MO 65409-0660

PROFESSIONAL PREPARATION

Colorado School of Mines	Geological Engineering	B.S., 1982
Colorado School of Mines	Mining Engineering	Ph.D., 1989

PROFESSIONAL POSITIONS

Sr. Research Investigator, Rock Mech & Explosives Rsrch Ctr , Univ of Missouri-Rolla	2003-present
Assistant Professor, Geological Sci & Engng Dept, Univ of Missouri-Rolla	2003-present
Assistant Professor, Geological & Mining Engng & Sci Dept, Michigan Tech Univ	1998-2002
Assistant Professor, Mining Eng Dept, Colorado School of Mines	1996-1997
Research Assistant Professor, Earth Mechanics Inst, Colorado School of Mines	1990-1996
Mining Engineer, Environmental Section, U.S. Bureau of Mines	1988-1990

Research Interests: Mechanical excavation technology, rock fragmentation, the flow of fluids in fractured rock, rock mass characterization, and extra-terrestrial resource production.

PUBLICATIONS

Ten most closely related to proposed project:

1. Gertsch, L. in review. "Experimental evaluation of stress-permeability models of a rock fracture: Far-field data," submitted to Rock Mechanics and Rock Engineering.
2. Gertsch, R. and L. Gertsch, 2002. "Mechanical mining: The state of the art," AIME Transactions.
3. Gertsch, L., A. Fjeld, B. Nilsen, and R. Gertsch, 2000. "Use of TBM muck as construction material," Tunneling and Underground Space Technology, Vol 15, No. 4, p 379-402.
4. Gertsch, R.E., L.S. Gertsch, and J.L. Remo, 1997. "Mining near Earth resources," in Near Earth Objects, the United Nations International Conference, Annals of the New York Academy of Sciences, Vol 822, p 511-537.
5. Gertsch, L.S. and R.E. Gertsch, 1997. "Excavating on the Moon and Mars," Chap 16, NASA CP-3360, Shielding Strategies for Human Space Exploration, J.W. Wilson et al. (ed), Lunar and Planetary Institute, Houston, Dec 1995, p 329-364.
6. Gertsch, L.S., 1995. "Three-dimensional joint network models from laboratory scale rock samples," Tech. Note, Int'l Jour Rock Mech Min Sci and Geomech Abstr, Vol 32, No. 1, p 85-91.
7. Zahl, E.G. *et al*., 1992. "Groundwater Flow Control in Mining Waste Disposal", Chap12.2, The Mining Engineering Handbook, 2nd edition, Society for Mining Metallurgy & Exploration, Littleton, CO.
8. Gertsch, L.S., 1992. The Mappability of Rock Fractures, final report for the National Science Foundation (Planning Grant MSS-9112660), paper and videotape versions.
9. Boldt, C.M., L.A. Atkins, and L.E. Gertsch, 1990. "Acid leaching of cemented backfill," Mining Engineering.
10. Sour, L.E., A.M. Richardson, S. Brown, W.A. Hustrulid, and E.N. Lindner, 1985. "A field study of coupled mechanical-hydrological processes in fractured crystalline rock," Coupled Processes Associated with Nuclear Waste Repositories, Lawrence Berkeley Laboratory, p 699-710.

Synergistic activities:

1. Regularly teach the "Geology for Engineers" course at UMR, often the only geology instruction received by engineering (and non-engineering) students, since 2003.
2. Faculty advisor to the UMR Student Chapter of Women in Mining (the only official student chapter), since 2003.
3. Reviewed ground control measures and roof/rib stability, and made safety recommendations, for Quincy Adit, Hancock, MI (1998-2002).
4. Numerous talks and presentations on extra-terrestrial mining and basic mining engineering for non-professional groups (high school science teachers, elderhostel guests, high school students, spouse programs), since 1992.
5. Science fair judge (Spokane, WA; Arvada, CO; Rolla, MO), since 1990.

Collaborators and Other Affiliations since 2001:

Cleveland-Cliffs Iron, Hibbing Taconite Co.: Ronald Graber, Michael Orobona, Peter Vandelinder
Colorado School of Mines: Brian Asbury, Brad Blair, Mike Duke, Masami Nakagawa, Ugur Ozbay, Levent Ozdemir, Tibor Rozgonyi
Independent Consultants: Jack Eloranta, Howard Handewith, John Hanlen, Jamal Rostami
Orbitec: Eric Rice, Robert Gustafson, Brant White
Others: Susana Carranza (Makel Engineering), Larry Clark (Lockheed-Martin), Richard Dissly (Ball Aerospace), Alex Ignatiev (Univ of Houston), Frank Klima (Superior Rock Bit), Ed McCullough (Boeing Phantom Works), Hugh Miller (Univ of Arizona), Takashi Nakamura (Physical Sciences Inc), Peter Smeallie (American Rock Mechanics Assoc), Ron Turner (ANSER Analytical Services), Karl Zipf (U.S. Dept of Interior), Robert Zubrin (Pioneer Astronautics)
Michigan Technological University: Xiaodi Huang, Jim Hwang, Francis Otuonye, Dae Young
NASA: Melanie Bodiford, Robert Cassanova, Peter Curreri, Robert Johnson, William Larson, Diane Linne, David McKay, Rob Mueller, Diane Linne, Clyde Parrish, Don Rapp, Kris Romig, Kurt Sacksteder, Gerald Sanders, Ron Schlagheck, Laurent Sibille, Allen Wilkinson
Northern Centre for Advanced Technology: Dale Boucher, Jim Richard
The Robbins Group: Richard J. Robbins, Tyler Sandell
U.S. Department of Energy: Mike Canty, Morgan Mosser, Joseph Renk III
U.S. Steel, Minntac Mine: Bruce Kniviila, Frank Pezutto, James Swearingen, Scott Vogle
Advanced Ceramic Materials and Advanced Ceramic Research: David Blanchard, J. Halloran, Marlene Platero, Mark Rigali

Graduate advisor: Prof. William A. Hustrulid, retired

Postdoctoral advisor: none

Thesis and Postdoctoral advisees (all at MTU): Aimee Blanchard, 1998-2001; Audie MacDonnell, 1999-2001; James Stewart, since 2001.

Biographical Sketch

FRANK GIOVANE
giovane@nrl.navy.mil
(202) 767 3188

Space Science Division,
Naval Research Laboratory
Washington, DC 20375-5320

PROFESSIONAL PREPARATION

Brooklyn College	Physics	B.A., 1962
University of Pennsylvania	Astronomy	Ph.D., 1977

PROFESSIONAL POSITIONS

1996-present **Associate Superintendent**, Naval Research Laboratory, Washington, DC
1990-96 **Program Scientist and Program Manager**, Office of Space Science, NASA HQ, Wash., DC
Managed several space missions including SIRTF, GP-B, Astro-E
1988-90 **Program Director**, Div. of Astronomical Sciences, National Science Foundation, Wash., DC
Managed the Instrumentation and Development Program and the FFRDC, NAIC
1979-88 **Associate Research Scientist**, Space Astronomy Lab, SUNY Albany and U of Florida
1975-79 **Physicist**, US Coast Guard R&D Center, Groton, CT
1972-75 **Research Associate**, Dudley Observatory, Albany, NY
1969-72 **Daniels Fellow**, University of Pennsylvania, Philadelphia, PA
1965-69 **Physicist and Astronomer**, US Naval Observatory, Washington, DC
1962-65 **Astrophysical Observer**, Smithsonian Astrophysical Obs., Cambridge MA

Present Research Interests:

Atmospheric and Cosmic Dust, low background radiation technology.

Principal Investigator:

Gas Proportional Detector Development Project
Mesospheric Aerosol – Genesis, Interaction and Composition Experiment (MAGIC)
Micro Chemistry Analysis of Various Environmental Radioactive Nuclei
Germanium Low Background Detector Development
Pluto, project to testing and evaluate low background nuclear detection instrumentation

Co-Investigator:

Pindrop, project to develop an acoustic sensor system for determining the time of particle impact and particle characteristics in aerogel cosmic collection systems
GIADA, ESA Rosette Cometary Mission Dust Flux Analyzer
LAD-C, Large Area Dust Collector Experiment for Space Station
SAC, Stratospheric Aerosol Collector Experiment balloon flight series
Impact, ESA Space Station Project Microgravity Interaction in Cosmic and Atmospheric Particle Systems

PUBLICATIONS (cosmic and atmospheric dust relevant publications)

Atmospheric Aerosols: Results of a Solar Occultation Technique from Skylab, Journal Space Research, JulY 1975, Greenberg, J.M, D.W.Schuerman, F.Giovane

Atmospheric Aerosols: Results of a Solar Occultation Technique from Skylab, Space Research, 16, 887, 1976, Schuerman,D.W., F.Giovane, J.M.Greenberg

A Solar Occulatation Technique for Remote Sensing of Particulates in the Earth's Atmosphere I: The Inversion of Horizon Radiances from Space, Geo Phys Res., 81, 5375, 1976; Schuerman,D.W., F.Giovane, J.M.Greenberg

A Solar Occulatation Technique for Remote Sensing of Particulates in the Earth's Atmosphere II: SKYLAB results of a 50 Ken Aerosol layer, GeoPhys Res., 81, 5383, 1976; Giovane, F., D.W.Schuerman, J.M.Greenberg

A Photographic Coronagraph, Skylab Particulate Experiment T025, Applied optics, 16, 993, 1977; Giovane, F., D.W. Schuerman, and J.M.Greenberg

A Photopolarimeter for Optically Probing Comet Halley, Applied Optics, 30, 2579, June 1991, Giovane,F., G.Eichhorn, M.Festou, P.Lamy, J.M.LeBlanc, A.C.Levasseur-Regourd, A.Llebaria, J.L.Weinberg, and A. Weisenberger.

Dust Flux Analyzer Experiment for the Rosetta Mission, M.R.Leese, J.A.M.McDonnell, S.F.Green, E.Busoletti, B.C.Clarke, L.Colangeli, J.F. Crifo, P.Eberhardt, F. Giovane, E.Grun, B.A.S.Gustafson, D.W.Hughes, D.A.Jackson, P.L.Lamy, Y.Langevin, L.Mann, S.McKenna-Lawlor, W.G.Tanner, P.R.Weissman and J.C. Zarnecki., Adv. Space Research Vol 17, No12 pp(12)137-(12)140, 1996

The Concept of a Facility for Cosmic Dust Research on the International Space Station, I. Blum, Th. Hertning, M. Cabane, M. Fonda, F. Giovane, B.A.S. Gustafson, H.U. Keller, W.J. Markiewicz, A.-C. Levasseur-Regourd, J.-C. Worms, I. Nuth, F. Rogers, ESA SP-385, 303-308, 1996.

The GIADA Experiment For Rosetta Mission To Comet 46/Wirtanen: Design And Performances,E. Bussoletti', L. C~ange1i, J.J. Lopez Moreno, B. Epifani, V~ Mennella, F. Palomba, P. Palumbo, ARotundi, S. Vergara, I. Olivares, R. Rodrigo, F. Moreno, A. Molina, J.A.M. Mc Donnell, M. Leese, P. Lamy, S. Perruchot, J.F. Crifo, M. Fulle, J.M. Perrin, F. Angrilli, F. Bernrn, L. Casirn, G. Cherubirn, A.Coradini, F. Giovane, F. Grun, B. Gustafson, C. Maag, P.R. Weissmann, Adv in Space Research, 1999 ,24, 1149B

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Concepts for Dust Velocity Measurements Perruchot, S., P.L.Lamy, F. Giovane, and B.A. S. Gustafson, Physics, Chemistry, and Dynamics of Interplanetary Dust Colloq. Proceedings, 1996,

An Optical Instrument to Characterize Individual Dust Particles, Giovane, F., B.A.S.Gustafson, P.L.Lamy, Phys., Chem., & Dynamics of Interplan. Dust Colloq.Proceed., 1996,

A Dust Aggregation and Concentration System (DACS) for the Microgravity Space Environment, Giovane, F. and I. Blum, 1998 Proceedings of the Forth Microgravity Fluid Physics and Transport Phenomena Conference, 1998,

A Search for Small Comets with the Naval Space Command Radar, S.Knowles**,** R. Meier, B. Gustafson, F. Giovane, JGR Space Phys,104,1999, 12637

Calculation Of The Heat-Source Function In Photophoresis Of Aggregated Spheres, Y. Xu, B.A.S. Gustafson, F. Giovane, J. Blum, S. Tehranian, Phys. Rev. E., 60,1999,2347-2365

Experiments For In-Situ Monitoring Of Dust Environments In The Solar System, L. Colangeli, E. Bussoletti, , J.J. Lopez Moreno, B. Epifani, F. Esposito, V. Mennella, F. Palomba, P. Palumbo, ARotundi, S. Vergara, J.M.Jeronimo, A.C. Lopez-Jimenez, A. Molina, R. Morales, F. Moreno, I. Olivares, R. Rodrigo, J.E. Rodriguez-Gomez, A. Ruiz-Falco, J.A.M. Mc Donnell, M. Leese, P. Lamy, S. Perruchot, J.F. Crifo, M. Fulle, J.M. Perrin, F. Angrilli, A.Coradini, F. Giovane, E. Grun, B. Gustafson, C. Maag, P.R. Weissmann, Bull AAS, 31, 1999, 1119

Photophoresis of Micron-sized Particles in the Free-Molecular Regime, S. Tehranian, F. Giovane, J. Blum, Y.Xu, B.A.S. Gustafson, J. Heat & Mass Transfer, 44/9, 2001, 1649-1657

Planetary Aerosol Monitor/Interplanetary dust Analyzer, B.A.S. Gustafson, F. Giovane, T. Waldemarsson, L. Kolokolova, J. McKisson," in Light Scattering by Nonspherical Particles: Halifax Contrib., eds. G. Videen, et al, Army Research Laboratory, Adelphi, MD, 2000, 270-274.

The Large-Area Dust Detector Assembly (LADDA), J. Blum, F Giovane, A.Tuzzolino & R.B. McKibben, R. Corsaro, Adv. Space Res., 2001.

Large Area Dust Detector for Dangerous orbital Debris, F. Giovane**,** Bull AAS, 33 2002

BIOGRAPHICAL SKETCH

Marte S. GUTIERREZ
Associate Professor
Virginia Tech
Department of Civil and Environmental Engineering
200 Patton Hall, Blacksburg, VA 24060, USA
Tel: (540) 231 5477, Fax: (540) 231 7532
E-mail: magutier@vt.edu

EDUCATION
Post-doctoral Fellow, Norwegian Geotechnical Institute (NGI)
PhD, University of Tokyo
MS, University of the Philippines
BSCE (with honors), Saint Mary's University

APPOINTMENTS
Associate Professor, Virginia Tech, 8/2000 to present
Senior Engineer, Norwegian Geotechnical Institute, 10/1 991 to 8/2000
External Adviser and Examiner, University of Oslo, 9/1 996 to 8/2000

CLOSELY-RELATED PUBLICATIONS

1. Vardakos, S. and Gutierrez, M. (2005), "PDA-Based Digital Field Book for Rock Mass Classitication," *Proceedings Alaska Rocks 2005*, accepted for publication.
2. Gutierrez, M., Barton, N. and Itoh, J. (2004), "Numerical Modeling of a Twin Triple-Lane Tunnel Along Japan's Tomei II Highway," *Tunnels and Underground Space*, submitted for publication.
3. Gutierrez, M. (2004), "Rigorous Comparison of Discontinuum and Equivalent Continuum Simulation of Excavation in Fractured Rocks," *International Journal of Geonechanics,* ASCE, submitted for publication.
4. Gutierrez, M. and Lewis, R.W. (2002), "Coupling of Fluid Flow and Deformation in Underground Formations," *Journal of Engineering Mechanics*, ASCE, vol. 128, no. 7, pp. 779-787.
5. Gutierrez, M. (2001), "Design and Analysis of Underground Openings in Jointed Rocks," *ASCE National Capital Region Geotechnical Seminar*, Washington, DC, April 6, 2001.
6. Gutierrez, M., Øino, L.E. and Høeg, K. (2000), "The Effect of Fluid Content on the Mechanical Behaviour of Fractures in Chalk," *Rock Mechanics and Rock Engineering*, vol. 33, no.2, pp. 93-117.
7. Gutierrez, M. and Park, Y. (2001), "2D and 3D Distinct Element Modeling of the JangSung Tunnel, Kwangju, South Korea," *Report submitted to the Space Design and Planning Co. Ltd*., Tokyo, Japan.
8. Barton, N. and Gutierrez, M. (1995), "Application of Q-system, UDEC-BB and NMT Principles to Shimizu No. 3 Tunnel Design, Tomei II Highway Project," *NGI Report No. 951024-1* submitted to Japan Highways.
9. Gutierrez, M. (1998), "Shear Band Formation in Rocks with a Curved Failure Surface," *International Journal of Rock Mechanics and Mineral Science*, vol. 35, No. 415, pp. 447, paper no. 95.
10. Gutierrez, M. (2002), "Stress-Dependent Fluid Flow in Fractured Rocks: Laboratory Study and Numerical Modeling," *Proc. North American Rock Mechanics Symposium*, Toronto, Canada, July 7-10, 2002, vol.1, pp. 585-592.

AREAS OF INTEREST

Computational Geomechanics
Constitutive Modeling of Geomaterials
Underground Excavations in Rocks
Coupled Fluid Flow and Deformation in Porous and Fracture Media

AWARDS

Royal Postdoctoral Research Fellowship, Norwegian Council for Scientific and Industrial Research (NTNF), 10/1989-11/1991
Senior Visiting Scholarship, National Institute of Resources and Environment (NIRE), Science and Technology Agency (STA), Tsukuba, Japan, 8/1998
International Fellowship, National Science and Engineering Research Council (NSERC) of Canada, 1991.
Doctoral Scholarship, Japanese Ministry of Education (Monbusho), 6/1986-9/1989
Visiting Scholarship, Japan International Cooperation Agency (JICA), 4/1985-4/1986

RESEARCH AND CONSULTING

PI/co-PI of several major research projects and grants totaling more than $1,500,000 at Virginia Tech.
PI/co-PI of several research projects and grants totaling more than $3,000,000 at the Norwegian Geotechnical Institute (NGI).
Project manager and project engineer on several large consulting. Notable projects include:
Foundation analysis and design of several offshore platforms including the tallest concrete platform in the world, the Troll Platform
Subsidence analysis of several oil fields including the largest oil field in the North Sea, the Ekofisk
Foundation analysis and design of the longest bridge in Northern Europe, the Storæbelt Bridge between Denmark and Sweden
Analysis and design of several major tunnels in Norway, Japan, Korea and UK

PROFESSIONAL ACTIVITIES

Editorial Board Member, ASCE Journal of Geotechnical and Geoenvironmental Engineering
Organized/co-organized several workshops and conference sessions
Invited lecturer in several workshops and seminars
Member of three technical committees in professional organizations
Reviewer for several international journals and conference proceedings
Reviewer of research proposals for NSF, NSERC (Canada) and NFR (Norway)
Member of ARMA, ASCE, ASEE, CUREE, ISSMGE, ISRM, SPE and USUCGER

INVOLVEMENT IN GRADUATE RESEARCH AND ADVISING

3 PhD students completed and 8 MS theses completed
5 continuing PhD students and 6 continuing MS students

COLLABORATORS WITHIN THE PAST 48 MONTHS

Russel Green (*University of Michican*), Robert Ebeling, (*US Army Corps of Engineers*), Stephen Akers (*US Army Corps of Engineers*), Kord Wissman (*Geopier, Inc*.), Thanos Papanicolou (*Washington State University*), Neal Nagel (*Phillips Petroleum Co*.), Lee Chin (*Phillips Petroleum Co*.), Kaare Høeg, (*NGI and University of Oslo*), Roland W. Lewis (*University of Wales Swansea*), Calvin J. Ribbens, James R. Martin II, George Filz, J. Michael Duncan, James K. Mitchell and Panos Diplas (*all of Virginia Tech*). *PhD Advisor:* Prof. Kenji Ishihara, University of Tokyo

Biographical Sketch

William S. Henika Geosciences Department 4044 Derring Hall
bhenika@vt.edu Virginia Polytechnic Institute and State University
(540) 231-8990 Blacksburg, VA 24061-0420

PROFESSIONAL PREPARATION

University of Virginia	Bachelors	Geosciences -1965
	Masters	Geosciences-1969

PROFESSIONAL POSITIONS

Research Associate Virginia Museum of Natural History Adjunct Professor of Geosciences at Virginia Tech	2003-2005
Geologist Specialist- Blue Ridge Geology, VA Dept. of Mines, Minerals and Energy Adjunct Professor of Geosciences at Virginia Tech	1995-2003
Senior Geologist -Virginia Department of Mines, Minerals and Energy	1985-1995
Senior Exploration Geologist - BP, Mid-Continent Exploration	1980-1985
Senior Geologist – Virginia Department of Conservation and Economic Development	1968-1980
Exploration Geophysicist – Johns Manville of Canada LTD	1965
Exploration Geologist - North American Exploration- Charlottesville VA and Augusta ME	1964, 66-67
Engineering Technician – Schnabel Foundation Co., Washington D.C.	1960

Research Interests: Regional Structural Geology, Stratigraphy and Geotechnics in the Appalachian Thrust Belt.

PUBLICATIONS

***Most closely related to proposed project**:*

1. Henika, W.S., 1981,Geology of the Villamont and Montvale Quadrangles, Virginia: Virginia Division of Mineral Resources Publication 35, 18p.

2. Gathright,T.M.II, Henika, W.S., and Milici, R.C.,1982, Structural Elements Along the Central-Southern Appalachian Boundary Near Roanoke, Virginia: (abs.) Geol. Soc. of America Abstracts with Programs Vol. 14, Number 1 and 2, p. 65.

3. Bartholomew, M.J., Schultz, A.P., Henika, W.S. and Gathright, T.M. II, 1983, Geology of the Blue Ridge and Valley and Ridge at the Junction of the Central and Southern Appalachians, M.J. in Central Appalachian Geology NE-SE GSA 1982,p.121-170, Peter T. Lyttle, ed., published by the American Geological Institute.

4. Henika, W.S, 1987, Outcrop Derived Gamma Ray Stratigraphy on the Pine Mountain and Hunter Valley Thrust sheets;(abs.), Virginia Journal of Science, Vol. 38, no 2, p. 128.

5. Henika, W.S, 1988, Geology of the East Stone Gap Quadrangle Virginia; Virginia Division of Mineral Resources Publication 79, w/ color geol. map and Outcrop derived gamma ray log.

6. Henika, W.S., 1994, Internal Structure of the Coal Bearing Portion of the Cumberland Overthrust Block in Southwestern Virginia and adjoining areas, in Geology and Mineral Resources of the Southwestern Virginia Coalfield, Virginia Division of Mineral Resources Publication 131, p.100-120, w/1:100,000 scale structural contour and lineament maps.

7. Henika, W.S, 1997a, Geologic Map of the Roanoke 30 x 60minute quadrangle, Virginia: Virginia Division of Mineral Resources Publication 148, 1:100000 scale, colored geologic map w/explanation.

8. Henika, W.S, 1997b, Economic and Environmental Geology across the Boundary between the Blue Ridge and Valley and Ridge, near Roanoke, Virginia, Twenty-seventh annual Virginia Geologic Field Conference Guidebook.

9. Gilliam, D.R., and Henika, W.S., 1999, Engineering Challenges of Southwest Virginia, Field Trip Guidebook for the 50th Annual Highway Geology Symposium, Hotel Roanoke, May 20-23 1999, sponsored by Virginia Department of Transportation, Radford University Institute for Engineering Geosciences and Virginia Division of Mineral Resources, Transactions p.365-393.

10. Bartholomew, M.J., Schultz, A.P., Lewis A.E., McDowell, R.C. and Henika, W.S., 2000, Digital Geologic Map of the Radford 30 by 60 minute quadrangle, Virginia: Virginia Division of Mineral Resources Digital Publication DP--, 1:100,000 scale, colored geologic map w/explanation. – open file

Other Significant publications in Appalachian Thrust Belt Geology

1.Gathright, T.M.II, Henika, W.S. and Sullivan J.L, III, 1977, Geology of the Waynesboro East, and the Waynesboro West Quadrangles, Virginia Division of Mineral Resources Publication 3, 53p.w/color geol. Maps.

2. Gathright, T.M.II, Henika, W.S. and Sullivan J.L, III, 1978, Geology of the Grottoes, Ft. Defiance, Mount Sidney and Crimora Quadrangles Virginia: Virginia Division of Mineral Resources Publications 10-13,color geol. Maps (1:24,000) with map texts.

3. Rader, E.K. and Henika, W.S., 1978, Ordovician Shelf to Basin Transition, Shenandoah Valley, Virginia: in Contributions toVirginia Geology II, Virginia Division of Mineral Resources Publication 7, 154p. p. 55-65.

4. Bartholomew M.J., Gathright, T.M. II and Henika, W.S., 1981, A Tectonic Model for the Blue Ridge in Central Virginia: American Jour. Science, Vol. 289, p. 1164-1183.

5. Diffenbach, R.N., and Henika, W.S., 1988, Potential oil and gas prospects along the Northwest Edges of the Hunter Valley and Clinchport Thrust Sheets, Scott County, Virginia: Virginia Division of Mineral Resources Open File Report 88.3, p. 15-16

Synergistic activities:

- Currently a contract investigator in the USGS State Map Program working on Geologic Mapping Southwest of Roanoke, Virginia in the VDMR I81- I73 Corridor Project.
- Regional Geology Research Associate at the Virginia Museum of Natural History.
- Teaching Assistant On VT Geotechnical and Geological Engineering Laboratories and Field Trips

+

BIOGRAPHICAL SKETCH

JOHN A. HOLE

Address: Department of Geosciences, Virginia Tech,
4044 Derring Hall, Mail Code 0420, Blacksburg, VA 24061
Telephone: 1-540-231-3858 Facsimile: 1-540-231-3386
Email: hole@vt.edu WWW: http://www.geol.vt.edu/profs/jah/

a) Professional Preparation

Carleton University	Honours Geology and Physics	B.Sc. 1986
University of British Columbia	Geophysics	Ph.D. 1993
Stanford University	Geophysics	Postdoc 1993-1996
U.S. Geological Survey, Menlo Park	Geophysics	Postdoc 1996-1996

b) Appointments

2002 – present	Associate Professor, Department of Geosciences, Virginia Tech
1996 - 2002	Assistant Professor, Department of Geological Sciences, Virginia Tech

c) 10 Publications

Hole, J. A., Catchings, R. D., St. Clair, K. C., Rymer, M. J., Okaya, D. A., and Carney, B. J., 2001. Steep-dip seismic imaging of the shallow San Andreas Fault near Parkfield. *Science*, **294**, 1513-1515.

Hole, J. A., Zelt, C. A., and Pratt, R. G. (2005) Advancements in controlled-source seismic imaging: a blind test of traveltime and waveform tomography, *Eos Trans. Amer. Geophys. Union*, submitted.

Gettemy, G. L., Tobin, H. J., **Hole**, J. A., and Sayed, A. Y. (2004) Multi-scale compressional wave velocity structure of the San Gregorio Fault zone. *Geophys. Res. Lett*., **31**, L06601, doi:10.1029/2003GL018826.

Anderson, K. B., Spotila, J. A., and **Hole**, J. A., 2003. Application of geomorphic analysis and ground penetrating radar to characterization of paleoseismic sites in dynamic alluvial environments: An example from southern California, *Tectonophysics*, **368**, 25-32.

Catchings, R. D., Rymer, M. J., Goldman, M. R., **Hole**, J. A., Huggins, R., and Lippus, C., 2002. High resolution seismic velocities and shallow structure of the San Andreas fault zone at Middle Mountain, Parkfield, California, *Bull. Seismol. Soc. Amer*., **92**, 2493-2503.

Hole, J. A., H. Thybo, and S. L. Klemperer, 1996. Seismic reflections from the near-vertical San Andreas Fault. *Geophys. Res. Lett*., **23**, 237-240.

Hole, J. A., and B. C. Zelt, 1995. 3-D finite-difference reflection traveltimes. *Geophys. J. Int*., **121**, 427-434.

Hole, J. A., 1992. Nonlinear high-resolution three-dimensional seismic travel time tomography. *J. Geophys. Res*., **97**, 6553-6562.

Hole, J. A., Beaudoin, B. C., and Klemperer, S. L., 2000. Vertical extent of the newborn San Andreas Fault at the Mendocino Triple Junction. *Geology*, **28**, 1111-1114.

Hole, J. A., Brocher, T. M., Klemperer, S. L., Parsons, T., Benz, H. M., and Furlong, K. P., 2000. Three-dimensional seismic velocity structure of the San Francisco Bay Area. *J. Geophys. Res*., **105**, 13,859-13,874.

d) Synergistic Activities

Fellow, Geological Society of America

Computer Software

Computer software for the analysis and inversion of three-dimensional seismic travel time data has been requested by and distributed to scientists at *116 institutions* (university, government and industry) in *28 countries*.

Member IRIS-PASSCAL Steering Committee; operator for EarthScope facility

e) Collaborators & Other Affiliations

(i) Collaborators past 48 months (not including those at VT)

KB Anderson (ExxonMobil), C Andronicos (UT El Paso), RD Catchings (USGS), RM Clowes (British Columbia), K Dueker (Wyoming), M Ducea (Arizona), GD Fuis (USGS), GL Gettemy (New Mexico Tech), G. Gohn (USGS), SL Klemperer (Stanford), K Miller (UT El Paso), I Morozov (Saskatchewan), DA Okaya (Southern California), RG Pratt (Queen's), T Ryberg (GFZ Potsdam), MJ Rymer (USGS), HJ Tobin (New Mexico Tech), G Zandt (Arizona), CA Zelt (Rice)

(ii) Advisors

PhD: RM Clowes (British Columbia), RM Ellis (British Columbia)

Postdoc: SL Klemperer (Stanford), WD Mooney (USGS)

(iii) Advisees past 5 years

MS: J Beale (ATS Intl.), BJ Carney (Columbia Gas), WR Lester (VT), LJ Perren (ATS Intl.), AY Sayed (Schlumberger), A Shumaker (VT), D Yancey (VT)

PhD: AK Sharma (VT), J. Wu (VT)

Postdoc: F. Bleibinhaus (VT)

Matthias G. Imhof

Professional Preparation

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
Ph.D. degree in Earth, Atmospheric, and Planetary Sciences, 1996. Thesis, under Professor M.N. Toksöz, on 'Scattering of Elastic Waves using Non-Orthogonal Expansions'.

EIDGENÖSSISCHE TECHNISCHE HOCHSCHULE Zürich, Switzerland
Diploma in Earth Sciences (Geophysics), 1991. Thesis, under Professor S. Müller, on 'A Seismostratigraphic Contribution to the Classification of Gravel Deposits in the Rafzerfeld'.

Appointments

VIRGINIA TECH, August 2004 - present Blacksburg, VA
Associate Professor of Geophysics, Department of Geosciences.

VIRGINIA TECH, 1998 - 2004 Blacksburg, VA
Assistant Professor of Geophysics, Department of Geosciences.

MASSACHUSETTS INST OF TECHNOLOGY, 1996 - 1998 Cambridge, MA
Postdoctoral Associate / Research Scientist at the Earth Resources Laboratory.

POLYDYNAMICS LTD, 1989 - 1991 Switzerland
Scientific Consultant. Developing experiments, algorithms, numerical models, and simulations of coupled diffusion problems.

Recent Publications: * denotes student authors

E. Nowak*, **M. G. Imhof**, 'Diffractor Signature Enhancement via Weighted and Unweighted Radon Transforms', *Journal of Seismic Exploration*, in press.

R. Bansal* and **M. G. Imhof**, 'Enhancement of Fracture Signals on Surface Seismic Data', *Geophysics*, in press.

S. J. Ellison*, **M. G. Imhof**, C. Çoruh, D. A. Fuqua, and S. C. Henry, 'Modeling Offset-Dependent Reflectivity for Time-Lapse Monitoring of Water-Flood Production in Thin-Layered Reservoirs', *Geophysics*, 69(1), 25–36, 2004.

M. G. Imhof, 'Computing the Elastic Scattering from Inclusions Using the Multiple Multipoles Method in 3D', *Geophysical Journal International*, 156(2), 287–296, 2004.

M. G. Imhof, 'Scale Dependence of Reflection and Transmission Coefficients', *Geophysics*, 68(1), 322–336, 2003.

M. G. Imhof and W. C. Kempner, 'Seismic Heterogeneity Cubes and Corresponding Equiprobable Simulations', *Journal of Seismic Exploration*, 12(1), 1–16, 2003.

M. G. Imhof, 'Estimating Reservoir Changes from AVO Changes', *Journal of Seismic Exploration*, 12, 141–150, 2003.

M. G. Imhof and M. N. Toksöz, 'The Effect of Multiple Cavity Explosions on Seismic Signatures', *Bulletin of the Seismological Society of America*, 92(6), 2381–2390, 2002.

M. G. Imhof and M. N. Toksöz, 'Calculating Seismic Source Signatures for Explosions in and around Cavities', *Bulletin of the Seismological Society of America*, 90(1), 229–242, 2000.

M. G. Imhof, M. N. Toksöz, C. I. Burch, and J. H. Queen, 'Near Surface Scattering from High Velocity Carbonates in West Texas', *Journal of Seismic Exploration*, 8(4), 221–242, 1999.

Synergistic Activities

Member of the Technical Program Committee for the 74th Annual Meeting of the Society of Exploration Geophysicists, 2004.

Vice Chairman of the Student Sections/Academic Liaison Committee of the Society of Exploration Geophysicists, 2003.

Member of the Research Committee of the Society of Exploration Geophysicists, 2003.

Member of the Technical Program Committee for the 72nd Annual Meeting of the Society of Exploration Geophysicists, 2002.

Collaborators

R. Bansal, UT Austin; J. Castle, Clemson University; R. Coates, Schlumberger; C. Çoruh, VT; T. Daly, LBNL; D. A. Fuqua, ChevronTexaco; J. Harris, Stanford University; S. C. Henry, BHP Billiton; J. Hole, VT; W. C. Kempner, ChevronTexaco; E. L. Majer, LBNL; L. Myer, LBNL; E. Nowak, ConocoPhillips; J. H. Queen, HighQ; M. N. Toksöz, MIT; R. Turpening, Michigan Tech; S. J. Tyree, Anadarko.

Advisor

M.N. Toksöz, MIT (both Ph.D. and postdoctoral).

Former Advisees: 3

R. Bansal (MS. now at UT Austin), S. J. Ellison (MS, now at ChevronTexaco), and E. Nowak (PhD, now at ConocoPhillips).

Current Advisees: 5

K. Hassinger (MS), S. Mahapatra (PhD), J. Mitra (PhD), A. Sharma (PhD) and D. Yancey (MS).

Active and Recent Grants

U.S. Department of Labor, 'Geophysical Void Detection: Inseam Seismics'. Collaborative project between Marshall Miller & Associates Virginia Tech, and Virginia Department of Mines, Minerals and Energy: in total $283,777.

Department of Energy, Office of Fossil Energy, 'Seismic Determination of Reservoir Heterogeneity: Application to the Characterization of Heavy Oil Reservoirs', Collaboration with J. Castle, Clemson University, and ChevronTexaco: in total $450,071 (09/01/00 - 08/31/04).

Department of Energy, 'Development and Validation of the Next Generation Method for Quantifying Naturally Fractured Gas Reservoirs'. Collaboration with Lawrence Berkeley National Laboratory, ConocoPhillips, Schlumberger, and Stanford University. The proposal received $3.5 million from DOE (05/16/00 - 03/31/04).

Gary K. Jacobs, Director
Environmental Sciences Division
Oak Ridge National Laboratory
PO Box 2008, MS-6035Oak Ridge, TN 37831
(865) 576-0567 (phone)
(865) 574-7287 (fax)
jacobsgk@ornl.gov (email)

Research Interests and Experience

Gary has always enjoyed problem solving, research, and management in the earth sciences. His strength is in being an **Environmental Science Generalist**, having performed fundamental and applied research in a broad range of topics using laboratory, field, computational, and theoretical methods. His formal training and experience was in high-temperature petrology and geochemistry. He has enjoyed the luxury of being able to experience many other of areas of science. Throughout his career at ORNL he has applied his expertise in geochemistry to (1) carbon sequestration R&D, (2) subsurface science, (3) *in situ* remediation science and technology, and (4) research on high-level radioactive waste disposal. He now enjoys the challenge of assimilating new knowledge across a broad spectrum of environmental science (e.g., atmospheric science, ecology, microbiology, and societal-technology interactions).

Gary serves as the point-of-contact for ORNL research in Climate Change and Environmental Remediation under the U.S. Department of Energy, Office of Science, Biological and Environmental Research.

Positions

Oak Ridge National Laboratory, Oak Ridge, TN

- ✓ Director, Environmental Sciences Division, 2004 – Present
- ✓ Deputy Director, Environmental Sciences Division, 1998 – 2004
- ✓ Head, Earth & Engineering Sciences Section, 1995 – 1998
- ✓ Leader, Subsurface & Surficial Geochemistry Group, 1988 – 1995
- ✓ Research Geochemist, 1983 – 1988

Rockwell Hanford Operations, Richland, WA

- ✓ Senior Geochemist, Basalt Waste Isolation Project, 1981 – 1983

Grand Valley State University, Allendale, MI

- ✓ Assistant Professor of Geology, 1980 – 1981

Education

The Pennsylvania State University	Ph.D.	1981	Geochemistry
University of Vermont	B.A.	1976	Geology

Professional Affiliations & Activities

American Association for the Advancement of Science, American Geophysical Union, Geological Society of America
Tennessee Registered Professional Geologist (TN# 0354)

Selected Publications

Phelps, T J., D. J. Peters, S. L. Marshall, O. R. West, L. Liang, J. G. Blencoe, V. Alexiades, G. K. Jacobs, M. T. Naney, J. L. Heck, Jr., 2001, A new experimental facility for investigating the formation and properties of gas hydrates under simulated seafloor conditions, Review of Scientific Instruments 72, 1514-1521.

Jacobs, G. K., R. C. Dahlman, F. B. Metting, 2001, Carbon sequestration in terrestrial ecosystems: A status report on R&D progress, Proceedings of the First National Conference on Carbon Sequestration, Washington, D.C., May 15-17, 2001

Dahlman, R. C. and G. K. Jacobs, 2000, Research challenges for carbon sequestration in terrestrial ecosystems, Proceedings of a Symposium on CO_2 Capture, Utilization, and Sequestration at the American Chemical Society National Meeting, August 20, 2000, Washington, D. C.

Jacobs, G. K. and G. R. Hendrey, 2000, Chapter Four – Carbon Sequestration in Terrestrial Ecosystems in US DOE, Carbon Sequestration Research and Development, DOE/SC/FE-1, Washington, D.C.

Gu, B., T. J. Phelps, L. Liang, M. Dickey, Y. Roh, B. L. Kinsall, A. V. Palumbo, G. K. Jacobs, G. K., 1999, Biogeochemical Dynamics in Zero-Valent Iron Columns: Implications for Permeable Reactive Barriers, Environ. Sci. Technol. 33, 2170-2177

Dunbar, N. W., G. K. Jacobs, and M. T. Naney, 1995, Crystallization processes in an artificial magma: Variations in crystal shape, growth rate, and compositions with melt cooling history, Contributions to Mineralogy and Petrology 120, 412-425.

Alexiades, V. and G. K. Jacobs, 1994, Solidification modeling of *in situ* vitrification melts, in Proceedings of Dynamic Systems and Applications, Vol. 1, G. S. Ladde and M. Sambandham, eds., Dynamic Publishers, 11-16.

Alexiades, V., G. K. Jacobs, and N. W. Dunbar, 1994, Constraints on mass balance of soil moisture during *in situ* vitrification, Environmental Geology 23, 83-88.

Dunbar, N. W., L. R. Riciputi, G. K. Jacobs, M. T. Naney, and W. H. Christie, 1993, Generation of rhyolitic melt in a an artificial magma: Implications for fractional crystallization processes in natural magma, Journal of Volcanology and Geothermal Research 57, p. 157-166.

Solomon, A. D., V. Alexiades, and G. K. Jacobs, 1993, Heat transfer analysis of a field-scale melting experiment, International Communications in Heat and Mass Transfer 20 (6), 793-801.

Jardine, P. M., G. K. Jacobs, and G. V. Wilson, 1993, Unsaturated transport processes in undisturbed heterogeneous porous media I. Inorganic Contaminants, Soil Science Society of America Journal 57, 945-953.

Jardine, P. M., G. K. Jacobs, and J. D. O'Dell, 1993, Unsaturated transport processes in undisturbed heterogeneous porous media II. Co-Contaminants, Soil Science Society of America Journal 57, 954-962.

Jacobs, G. K., N. W. Dunbar, M. T. Naney, and R. T. Williams, 1992, Petrologic and geophysical studies of an artificial magma, *EOS*, Transactions, American Geophysical Union 73, p. 401 & 411-412.

Biographical Sketch

YURI A. KAMYSHKOV
kamyshkov@utk.edu
(865) 974-6777

Department of Physiocs and Astronomy
University of Tennessee, 401 Nielsen Physics Bldg.
Knoxville, TN 37996-1200

PROFESSIONAL PREPARATION

Moscow Institute for Physics and Technology (MPTI)	Physics	M.A., 1970
Moscow Institute for Theoretical and Experimental Physics (ITEP)	Physics	Ph.D., 1978

PROFESSIONAL POSITIONS

Professor, University of Tennessee	1999-present
Research Professor, Joint employee of ORNL and UT	1991-1999
Employee of ITEP Moscow, positions from laborant to senior scientist	1969-1991

Research Interests: neutron-antineutron oscillations, neutrino physics, nucleon decay

PUBLICATIONS
Most closely related to proposed project:

1. "First results from KamLAND: evidence for reactor anti-neutrino disappearance", K. Eguchi *et al.*, Phys. Rev. Lett. 90:021802,2003; e-Print arXiv: **hep-ex/0212021.**
2. T. Araki *et al.*, KamLAND Collaboration, "Measurement of neutrino oscillation with KamLAND: Evidence of spectral distortion," arXiv: **hep-ex/0406035**.
3. K. Anderson *et al.*, "White paper report on nuclear reactors for θ_{13} search", **arXiv:hep- ex/0402041**.
4. S. Berridge et al., "Proposal for U.S. participation in double-CHOOZ: A new θ_{13} experiment at the Chooz reactor," arXiv: **hep-ex/0410081**.
5. Neutron-Antineutron Oscillations, Yu. Kamyshkov, in Proceedings of 14th Rencontres de Blois: Matter-Antimatter Asymmetry, Chateau de Blois, France, 17-22 Jun 2002, e-Print Archive: **hep-ex/0211006.**
6. Signatures of nucleon disappearance in large underground detectors, Yu. Kamyshkov, Edwin Kolbe, Phys. Rev. D67: 076007,2003, e-Print Archive: **nucl-th/0206030.**
7. Nucleon instability and (B–L) non-conservation, Yu. Kamyshkov, in proceedings of "Stony Brook 1999, Next generation nucleon decay and neutrino detector" pp. 84-87.
8. Neutron→Antineutron Transitions and (B–L) non-conservation, Yu. Kamyshkov, Comments on Modern Physics, 2:A249-A260, 2002.

Publication list: complete list of publications can be found at http://www.slac.stanford.edu/spires/hep/.

Synergistic activities:

- Member of the Department Planning Committee.
- Member of TECOP outreach group in the Depertment.

Collaborators and Other Affiliations:

L3/CERN: U. Becker, B. Borgia, M. Bourquin, A. Engler, Yu. Galaktionov, H. Hoffer, K. Lubelsmeyer, S.C.C. TingC.

GEM/SSC: C. Baltay, B. Barish, M. Danilov, R. Imlay, J.P. Rutherfoord, G. Sanders, L.R. Sulak

KamLAND: J. Busenitz, G. Gratta, S. Freedman, K. Inoue, R. McKeown, H. Murayama, A. Piepke, J.Shirai, F. Suekane, A. Suzuki, P. Vogel

Double Chooz: M. Goodman, H. de Kerret, R. Svoboda, D.Reyna.

Graduate and Thesis advisor: Prof. Valentine Lyubimov, ITEP, 1971-1978

Postdoctoral advisor: Prof. Valentin Lubimov, ITEP, 1978-1982

THOMAS L. KIEFT
Biology Department
New Mexico Institute of
Mining and Technology
(New Mexico Tech)
Socorro, New Mexico 87801
http://infohost.nmt.edu/%7Ebiology/people/faculty/t_kieft/

Phone: (505) 835-5321
FAX: (505) 835-5668
E-mail: tkieft@nmt.edu

(a) Professional preparation

Carleton College, Biology, B.A., 1973
New Mexico Highlands University, Biology, M.S., 1978
University of New Mexico, Biology, Ph.D., 1983
University of California, Berkeley, Plant and Soil Biology, Post-doc 1983-1985

(b) Appointments

08/85 - Present	Faculty member (Professor since 1993), Biol. Dept., New Mexico Tech
12/04 -- Present	Adjunct Prof., Earth & Environ. Sci. Dept., New Mexico Tech
08/01 -- 12/01	Associate Vice-President for Academic Affairs and Dean of Students (Acting), New Mexico Tech
02/98 -- 08-01	Associate Vice-President for Research., New Mexico Tech
07/91 -- 02/98	Chairman, Biology Department, New Mexico Tech
01/97 - 12/97	Sabbatical Leave, Earth and Environmental Sciences Center, Pacific Northwest National Laboratory, Richland, WA
09/83 - 08/85	Visiting Assistant Research Microbiologist, Department of Plant and Soil Biology, University of California, Berkeley, CA
08/82 – 05/83	Asst. Prof., Biology and Environmental Science, New Mexico Highlands University

(c) Most closely related publications (40 total peer-reviewed publications, 9 book chapters)

Rutz, B. and T. L. Kieft. 2004. Phylogenetic characterization of dwarf archaea and bacteria from a semiarid soil. *Soil Biology & Biochemistry* 36:825-833.

Lehman, R. M., S. P. O'Connell, A. Banta, J. K. Fredrickson, A.-L. Reysenbach, T. L. Kieft, and F. S. Colwell. 2004. Microbiological comparison of core and groundwater samples collected from a fractured basalt aquifer with that of dialysis chambers incubated in situ. *Geomicrobiology Journal* 21:169-182.

Balkwill, D. L., T. L. Kieft, T. Tsukuda, H. M. Kostandarithes, T. C. Onstott, S. Macnaughton, J. Bownas, and J.K. Fredrickson. 2004. Identification of iron-reducing *Thermus* strains as *T. scotoductus*. *Extremophiles* 8:37-44.

Onstott, T. C., D. P. Moser, S. M. Pfiffner, J. K. Fredrickson, F.J. Brockman, T. J. Phelps, D. C. White, A. Peacock, D. Balkwill, R. Hoover, L. R. Krumholz, M. Borscik, T. L. Kieft, and R. Wilson. 2003. Indigenous and introduced microorganisms in rock samples from a deep gold mine. *Environmental Microbiology*. 5:1168-1191.

Oliver, D. S., F. J. Brockman, R. S. Bowman, and T. L. Kieft. 2003. Microbial Reduction of Hexavalent Chromium under Vadose Zone Conditions. *Journal of Environmental Quality* 32:317-324.

Five Other Publications

Fu, Z., S. Rogelj, and T. L. Kieft. Detection of *Escherichia coli* O157:H7 by immuno-magnetic separation and real-time PCR. *International Journal of Food Microbiology*. 99:47-57.

Liang, H., S. E. Cordova, T. L. Kieft, and S. Rogelj. 2003. Development of an immuno-PCR assay to detect Group A *Streptococcus*. *Journal of Immunological Methods* 279:101-10.

Kieft, T.L. 2002. Microbial Starvation Survival in Subsurface Environments. pp. 2019-2028. In: Encyclopedia of Environmental Microbiology, G. Bitton (Ed.) John Wiley, NY.

Kieft, T. L., and F. J. Brockman. Vadose zone microbiology. 2001. pp. 141-169. In: Subsurface Microbiology and Biogeochemistry. J. K. Fredrickson and M. Fletcher (Eds.), John Wiley & Sons, New York.

Kieft, T. L. 2000. Size matters: dwarf cells in soil and subsurface terrestrial environments. Ch. 3, pp. 19-46. In: Non-culturable Microorganisms in the Environment. R. R. Colwell and D. J. Grimes (Eds.), Amer. Soc. Microbiol., Washington, DC.

(d) Synergistic Activities

Mentor for NSF-funded U.S./South African Undergraduate Education and Research Workshops, 2001 and 2002, Bloemfontein, South Africa

Mentor for NSF-funded REU, Biogeochemical Educational Experiences-South Africa, Bloemfontein, South Africa 2003 and 2004. (http://geomicro.utk.edu/)

New Mexico Science Fair, mentoring of high school students and Science Fair judging, 19985 – present.

(e) Collaborators and other affiliations

i. Collaborators and coauthors, last 48 months

David L. Balkwill, Florida State University; Rob Bowman, New Mexico Tech; Fred Brockman, Pacific Northwest National Laboratory; F. S. Colwell, Idaho National Engineering Lab; Jim Fredrickson, Pacific Northwest National Laboratory; Zhu Fu, University of California, Berkeley; Lee Krumholz, University of Oklahoma; R. Michael Lehman; Huining Liang, BioSTAR, Inc.; USDA; Barbara Sherwood Lollar, University of Toronto; Sean P. O'Connell, Western Carolina University; T. C. Onstott, Princeton University; Tommy J. Phelps, Oak Ridge National Laboratory; Susan Pfiffner, University of Tennessee; A.L. Reisenbach, Portland State University; Snezna Rogelj, New Mexico Tech; Gordon Southam, University of Western Ontario

ii. Graduate and postdoctoral advisors

M.S. advisor: John W. Spencer, New Mexico Highlands Univ., retired

Ph.D. Advisor: Douglas E. Caldwell, University of Saskatchewan

Post-doctoral advisor: Mary K. Firestone, University of California, Berkeley

iii. Former Advisees (20 total graduate students, 0 postdocs)

John Ayarbe, R. Hicks, Inc., Albuquerque, NM; Robin Brown, New Mexico Environment Department; James Elliott, University of New Mexico; Bill Kovacik, Pacific Northwest National Laboratory; Sean McCuddy, Environmental consulting firm, Chicago; Misty Milleson, Lovelace Research Institute; Bridget Rutz, University of New Mexico; Rebekah Silva, University of New Mexico

CURRICULUM VITAE

Dr. RICHARD A. KROEGER

Experience:	1989-date	Experimental Astrophysicist, Naval Research Lab
	1987-1989	Systems Engineer, Hughes Aircraft Company
	1985-1987	OSSE Instrument Scientist, Univ. Space Res. Assoc. / NRL
	1985	Research Associate, Enrico Fermi Institute, Chicago, IL
Education:	Ph.D.	Physics, 1985, University of Chicago
	M.S.	Physics, 1979, University of Chicago
	B.A.	Physics and Mathematics, 1977, Univ. of Northern Iowa

Duties and Accomplishments:

- Lead scientist responsible for NRL contributions to the MCAVERN project, Laboratori Nazionale del Gran Sasso, Italy.
- Lead scientist responsible for the Kimballton Low Background Facility.
- Principle Investigator of NASA Space Research and Technology grant to develop imaging germanium strip detectors.
- CCD detector lead scientist on NASA's STEREO/SECCHI mission.
- Principle Investigator of NASA Explorer Advanced Technology grant to develop fine spatial resolution germanium module with cryocooler and CMOS integration.
- Developing innovative detector packaging techniques for spaceflight with Ball Aerospace .
- Sub-contracted to Physical Sciences Inc. to commercialize technology (Phase II SBIR).
- Developed ASIC implementation, specifications and testing for ATIC balloon experiment
- Demonstrated imaging performance using a scintillator on a position sensitive photomultiplier tube.
- Compton Gamma Ray Observatory timeline member and host.
- Co-investigator on the Constellation/HXT team and mission concept study.
- Co-investigator on other NASA and DOE proposals from NRL.

Dr. Kroeger's recent work includes implementation of low background germanium and gas detectors at the Laboratori Nazionale del Gran Sasso. He is also principally responsible for starting the germanium detector development program at NRL, beginning in 1990. This program has successfully demonstrated excellent imaging and spectroscopy performance. He has also discovered that these detectors make excellent gamma ray polarimeters. In addition to this work, he has instrumented an imaging position sensitive photomultiplier tube and developed position algorithms in support of past MidEx proposals. He also has experience developing detectors operated in a helium-3 cryostat, and in the operation and testing of space hardware (NASA's Compton Gamma Ray Observatory).

Memberships:

- Institute of Electrical and Electronics Engineers (IEEE) since 1989
  - Chairman of the Imaging Session, 1996 Nuclear Science Convention
  - Co-organizer of the Compton scatter workshop, IEEE 1996
- The International Society for Optical Engineering (SPIE) since 1995
- American Astronomical Society (AAS) since 1990
- American Physical Society (APS) since 1973
  - Member of the High Energy Astrophysics Division since 1979

Over 30 scientific and technical publications. PDF copies of his 21 detector related papers are available at: http://heseweb.nrl.navy.mil/gamma/detector/PSGD_papers.htm

Curriculum Vita for John G. Learned

EDUCATION:

	B.A. Columbia College (Physics).	1961
	M.S. University of Pennsylvania (Physics)	1963
	PhD. University of Washington (Physics)	1968

CURRENT POSITION: Professor of Physics, University of Hawaii, Manoa

EXPERIENCE: Thirty years researching particle physics and astrophysics, at accelerators and from deep mines to mountain tops. Prior to graduate school was engineer in aerospace industry, with specialization in communications systems, antenna design and cryptography. Physics career has been centered around neutrino studies; a founder of neutrino astronomy. Designed and operated several generations of large underground neutrino detectors, most recently the Super-Kamiokande experiment which discovered neutrino oscillations and mass. Continue to make contributions to particle astrophysics and neutrino astronomy, and involved in several new research initiatives in neutrino studies.

SELECTED PUBLICATIONS: (*for more detail see* http://www.phys.hawaii.edu/~jgl)

Indications of neutrino oscillation in a 250-km long-baseline experiment, M. H. Ahn *et al.* [K2K Collaboration], arXiv:hep-ex/0212007.

Search for supernova relic neutrinos at Super-Kamiokande, M. Malek *et al.* [Super-Kamiokande Collaboration], arXiv:hep-ex/0209028.

Neutrino-induced collapse of bare strange stars via TeV-scale black hole seeding, P. Gorham, J. Learned and N. Lehtinen, astro-ph/0205170.

Determination of solar neutrino oscillation parameters using 1496 days of Super-Kamiokande-I data, S. Fukuda *et al.* [Super-Kamiokande Collaboration], Phys. Lett. B **539**, 179 (2002)

Search for neutrinos from gamma-ray bursts using Super-Kamiokande, S. Fukuda *et al.* [the Super-Kamiokande Collaboration], astro-ph/0205304.

Learned, John G., and Karl Mannheim, **High Energy Neutrino Astrophysics**, *Ann. Rev. of Nuc. and Part. Science* **50**, 679-749, *2000*.

Learned, John G., **Atmospheric Neutrino Oscillations**, *Chapter in* **Current Aspects of Neutrino Physics**, David O. Caldwell, ed., *Springer-Verlag*, *2001*; hep-ex/0007056.

Fukuda, Y., *et al*., The Super-Kamiokande Collab.**, Evidence for Oscillation of Atmospheric Neutrinos**, *Phys. Rev. Lett*. **81**, 1562, *1998*; hep-ex/9807003. *(Most cited article in experimental particle physics).*

Fukuda, Y., *et al*., The Super-Kamiokande Collab., **Measurements of the Solar Neutrino Flux from Super-Kamiokande's First 300 Days**, *Phys. Rev. Lett*. **81**, 1158, *1998*; hep-ex/9805021.

Learned, John G., and Sandip Pakvasa, **Detecting Tau Neutrino Oscillations at PeV Energies**, *Astroparticle Physics J*. **3**, 267, *1995*.

Bahcall, J.B., K. Lande, R.E. Lanou, J.G. Learned, R.G.H. Robertson, and L. Wolfenstein, **Progress and Prospects in Neutrino Astrophysics**, *Nature* **375**, 29, *1995*.

Learned, John G., Sandip Pakvasa, and Thomas J. Weiler, **Neutrino Mass and Mixing Implied by Underground Deficit of Low-Energy Muon-Neutrino Events**, *Phys. Lett.* **B 207**, 79, *1988*.

Bionta, R.M., J.G. Learned, et al., The IMB Collab., **Observation of a Neutrino Burst in Coincidence with Supernova 1987A in the Large Magellanic Cloud**, *Phys. Rev. Lett*. **58**, 1494, *1987*.

C. Derek Martin, PhD, PGeol, PEng

University of Alberta
Dept. Civil & Environmental Engineering
3-071 Markin/CNRL Natural Resources Engineering Facility
Edmonton, AB
CANADA T6G 2W2

Tel: +1 780 492-2332
Fax: +1 780 492-8198
Email: derek.martin@ualberta.ca

EDUCATION

1993 Ph.D. Civil & Geological Engineering, University of Manitoba, Winnipeg, Manitoba

1983 M.Eng. Civil/Geotechnical Engineering, University of Alberta, Edmonton, Alberta

1972 B.Sc. Geology, Memorial University, St. John's, Newfoundland

POSITIONS HELD

2000 – Pres. Professor, Dept. Civil & Environmental Engineering, University of Alberta, Edmonton, Alberta.

1998 – 2000.: Professor, School of Engineer, Laurentian University, Sudbury, Ontario.

1995 – 2000.: Associate Director of the Geomechanics Research Centre, Laurentian University, Sudbury, Ontario.

1987 - 1995: Senior advisor to the Director of the Canadian Nuclear Fuel Waste Management Program, and Head of the Geotechnical Research Section of AECL's Underground Research Laboratory, Pinawa, Manitoba.

1983 - 1987: Senior geotechnical engineer for EBA Engineering Consultants Ltd., Edmonton, Alberta.

1977 - 1983: Geotechnical engineer for B.C. Hydro, Vancouver, British Columbia.

1974 - 1977: Engineering geologist for I.D. Engineering Co., Winnipeg, Manitoba.

1972 - 1974: Engineering geologist for Geotechnical Associates, St. John’s Newfoundland

Dr. Ray E. Martin, P.E.
Ray E. Martin, LLC
114 North Railroad Ave
Ashland, VA23005
rayemartineng@aol.com
804-798-6218

PROFESSIONAL POSITIONS

Associate, Senior Associate, Principal, Executive Vice President, President	Schnabel Engineering Associates	1974-1993
President and CEO, CEO and Chairman, and Chairman	Schnabel Engineering Associates	1993-2002 retired

EDUCATION

B.S. Virginia Tech	Civil Engineering	1964
M.S. Virginia Tech	Civil Engineering	1968
Ph.D. West Virginia University	Civil Engineering	1972

PROFESSIONAL PRACTICE AREAS

Geotechnical Engineering
Fund Raising
Project Management

RELATED PUBLICATIONS

"Foundations in Weathering Profiles from Igneous and Metamorphic Rocks" (Invited Lecturer), 2001 A Geo Odyssey, ASCE Geotechnical Specialty Conference, Virginia Tech, Blacksburg, Virginia, June 2001.

"Landslide Evaluation in Virginia Coastal Plain", Co-author, Symposium, Slope Stability in the Coastal Plain, ASCE Annual Convention, Boston, Massachusetts, 1998.

"Embankment Dams in the Piedmont/Blue Ridge Province", Co-author, Proceedings, Design of Residual Soils: Geotechnical and Environmental Issues, ASCE National Convention, Washington, D.C., 1996.

"Evaluation of Reservoir Seepage in Karst Topography", Proceedings Geotechnical Engineering Symposium Spring Convention, ASCE, Nashville, Tennessee, 1988.

"Water Balance Modeling and Safe Yield Determination for Ground Water Management - Two Case Histories", Co-Author Proceedings, AWRA Symposium on "Coastal Water Resources", Wilmington, N.C., May 22-25, 1988.

OTHER SIGNIFICANT PROFESSIONAL ACTIVITIES

Member Geotechnical Engineering Committee, National Research Council, Washington, D.C., 2001-2004

Advisory Board Member, Civil Engineering Department, Virginia Tech, Blacksburg, Virginia, 1987-1993.

Member, Joint Senate-House Subcommittee, Virginia General Assembly, 1983-84, study on how Virginia can best maintain high quality engineering programs in its public institutions of higher education.

Member, Engineering Geology Committee of Geotechnical Engineering Division, ASCE, 1985-1997.

Graduate advisor: Dr. Lyle K. Moulton

Matthew Mauldon

Via Department of Civil & Environmental Engineering, Virginia Tech

A. Professional Preparation

Ph.D. Civil Engineering, University of California, Berkeley, 1992.
MS Geotechnical Engineering, University of California, Berkeley, 1986.
BA Geology, with highest distinction in general scholarship, University of California, Berkeley, 1985.

B. Appointments

Associate Professor (tenured) -Virginia Tech, Dept of Civil & Environmental Engineering, 2001-
Adjunct Assoc. Professor - Univ. of Tennessee Knoxville, Dept of Geological Sciences, 1999-
Associate Professor (tenured) - Univ. of Tennessee Knoxville, Dept of Civil & Environmental Engineering 1998 – 2000.
Assistant Professor - Univ. of Tennessee Knoxville, Dept of Civil and Environmental Engineering, 1992-98
Staff Engineer 1990, 1988, United States Bureau of Reclamation, Denver Colorado: Rock mechanics, data analysis and fracture characterization for the Yucca Mountain Project.
Staff Engineering Geologist, 1986-87, Converse Consultants, San Francisco, California: Fault studies, trench logging, well logging, dam modifications and rock reinforcement.

C. Publications

Vandewater, C.J., Dunne, W.M., Mauldon, M., Drumm, E.C., and Bateman, V. (in press). Classifying and Assessing the Contribution of Geology to Rockfall Hazard, Environmental & Engineering Geoscience

Rohrbaugh, M. B., W.M. Dunne and M. Mauldon, M. Estimating Joint Intensity, Density and Mean Tracelength Using Circular Scanlines and Circular Windows, Bulletin of the American Association of Petroleum Geologists, Vol 86 No.12 Dec 2002 pp. 2089-2104

Peacock, D.C.P., S.J. Harris and M. Mauldon, 2002, Use of Curved Scanlines and Boreholes to Predict Fracture Frequencies, Journal of Structural Geology, vol.25, no.1, pp.109-119, 01 Jan 2003

Rose, B. Mauldon, M., Bateman, V., Drumm, E., and Dunne, W. (2003) Rockfall Management System and Spatial Analysis of Rock Cuts, Proc. Soil & Rock America 2003: 12th Pan-American Conference on Soil Mechanics & Geotechnical Engineering & 39th U.S. Rock Mechanics Symposium, June 22-26 2003, Cambridge, Massachusetts, USA, pp 193–198

Mauldon, M., W. M. Dunne & M. B. Rohrbaugh, Jr., (2001) "Circular Scanlines and Circular Windows: New Tools for Characterizing the Geometry of Fracture Traces," Journal of Structural Geology, Paul Hancock memorial issue, Volume 23, Issues 2-3, 3 Feb 2001, pp. 247-258.

Rose, B. T., A. La Rosa, M. Mauldon, B. Ralston, E. C. Drumm, (2001) "GIS Landslide Inventory Along Tennessee Highways"; Proc 80th Annual Meeting of Transportation Research Board; Paper No. 01-0236; Washington, D.C.

Mauldon, M., Arwood, S. & Pionke, C., (1998) "Energy Approach to Rock Slope Stability Analysis," Journal of Engineering Mechanics, ASCE, Vol. 124 No.4 pp. 395-405.
Mauldon, M., B. Rose, E. C. Drumm and H. Moore, 2001. "Enterprise-Wide Geotechnical Information Management." Southeastern Transportation Geotechnical Engineering Conference (STGEC), Roanoke VA, October 2001.
Bryant, L., M. Mauldon, J. K. Mitchell (2003) Impact of Pyrite on Properties and Behavior of Soil and Rock (8 pages), Proc., 12th Pan-American Conf on Soil Mechanics and Geotechnical Engineering and the 39th U.S. Rock Mechanics Symposium, Soil & Rock America
Mauldon, M., "Estimating Mean Fracture Trace Length and Density from Observations in Convex Windows," Rock Mechanics and Rock Engineering, 1998, 31 (4) 201-216.

D. Synergistic Activities

- Established an interdepartmental course in Engineering Geology at the University of Tennessee
- Served as Associate Editor, or as a member of the Editorial Board of the following journals:
  - Environmental & Engineering Geoscience
  - Rock Mechanics & Rock Engineering
  - Journal of Geotechnical and Geoenvironmental Engineering
- Member, ASCE Engineering Geology and Site Characterization Committee
- Chair, ASCE Rock Mechanics Committee

E. Recent Collaborators

Dr. W. S. Dershowitz, Golder Assoc. Seattle WA
Dr. Joseph Dove, Virginia Tech, Blacksburg
Dr. Marte Gutierrez, Virginia Tech, Blacksburg
Dr. Eric Westman, Virginia Tech, Blacksburg
Dr. Eric Drumm, University of Tennessee, Knoxville
Dr. W. M. Dunne, University of Tennessee, Knoxville
Dr. Doug Bowman, Virginia Tech, Blacksburg

Graduate Advisor: Professor R. E. Goodman, University of California at Berkeley

F. Graduate Students (Committee Chair)

Jeramy Decker (Ph.D), Lee Bryant (MS), Chris Heiny (MS, University of Tennessee Geological Sciences, with W. M. Dunne), Brett Rose (Ph.D), Xiaohai Wang (Ph.D) Wendy Lawdermilk (MS, University of Tennessee Geological Sciences, with W. M. Dunne), Bruce Rohrbaugh (MS, University of Tennessee Geological Sciences, with W. M. Dunne), David Doolin (MS), Scott Arwood (MS)

BIOGRAPHICAL NOTES

Stefano Mazzoli

EDUCATION

Urbino University, Italy	Graduated (Italian "Laurea")	1988
ETH Zurich, Switzerland	Ph.D.	1993
Imperial College, London, U.K.	P.D.	1994

UNIVERSITY RELATED EMPLOYMENT

Professor of Structural Geology, University of Naples, Italy	Present
Associate Professor of Geology, University of Urbino, Italy	1999-2004
Assistant Professor of Structural Geology, University of Camerino, Italy	1996–1998
Contract Professor of Geology, University of Benevento, Italy	1995

Stefano Mazzoli *has been doing research in the fields of structural geology and tectonics. PhD in structural geology at the ETH Zurich (1989-1993; supervisor: Prof. John G. Ramsay), he subsequently awarded a Royal Society post-doctoral fellowship at the Imperial College, London (1993-1994; supervisor: Prof. Mike P. Coward). He has then worked as a consultant for Enterprise Oil Exploration, before obtaining a permanent position in the Italian academia. In the last few years, he has been working on deformation processes at various scales within the framework of the tectonic evolution of mountain belts, particularly in the Mediterranean area (e.g., Apennines). Current research activity involves cooperation with research groups from several European and extra-European Universities, as well as with the oil industry (e.g., Shell) and government institutions (e.g., Italian National Seismic Survey; Italian Geological Survey). The publication list includes papers in Tectonics, Geological Society of America Bulletin, Journal of the Geological Society of London, Journal of Structural Geology, Tectonophysics and other prominent journals, for which he also carries out review activity.*

Five Publications Relevant to this Proposal

Coward M.P., De Donatis M., Mazzoli S., Paltrinieri W. & Wezel F.C. 1999. Frontal part of the northern Apennines fold and thrust belt in the Romagna-Marche area (Italy): shallow and deep structural styles. ***Tectonics***, Vol. **18**, n. 3, 559-574.

Zuppetta A. & Mazzoli S. 1997. Deformation history of a synorogenic sedimentary wedge, northern Cilento area, southern Apennines thrust and fold belt, Italy. ***Geological Society of America Bulletin***, Vol. **109**, n. 6, 698-708.

Mazzoli S., Barkham S., Cello G., Gambini R., Mattioni L., Shiner P. & Tondi E. 2001. Reconstruction of continental margin architecture deformed by the contraction of the Lagonegro Basin, southern Apennines, Italy. ***Journal of the Geological Society***, Vol. **158**, 309-319.

Shiner P., Beccacini A. & Mazzoli S. 2004. Thin-skinned versus thick-skinned structural models for Apulian carbonate reservoirs: constraints from the Val D'Agri Fields. ***Marine and Petroleum Geology***, Vol. **21**, 805-827.

Butler R.W.H., Mazzoli S., Corrado S., De Donatis M., Di Bucci D., Gambini R., Naso G., Nicolai C., Scrocca D., Shiner P. & Zucconi V. 2004. Applying thick-skinned tectonic models to the Apennine thrust belt of Italy: Limitations and implications. In: *Thrust Tectonics And Petroleum Systems* (K. R. McClay, ed.), ***AAPG Memoir***, Vol. **82**, 647-667.

Five Other Significant Research Publications

Mazzoli S. & Carnemolla S. 1993. Effects of the superposition of compaction and tectonic strain during folding of a multilayer sequence – model and observations. ***Journal of Structural Geology***, Vol. **15**, n. 3/5, 277-291.

Cello G., Invernizzi C. & Mazzoli S. 1996. Structural signature of tectonic processes in the Calabrian Arc (southern Italy): evidence from the oceanic-derived Diamante-Terranova unit. ***Tectonics***, Vol. **15**, n. 1, 187-200.

Mazzoli S. & Di Bucci D. 2003. Critical displacement for normal fault nucleation from en-échelon vein arrays in limestones: a case study from the southern Apennines (Italy). ***Journal of Structural Geology***, Vol. **25**, n. 7, 1011-1020.

Di Bucci D. & Mazzoli S. 2003. The October-November 2002 Molise seismic sequence (southern Italy): an expression of Adria intraplate deformation. ***Journal of the Geological Society***, Vol. **160**, n. 4, 503-506.

Mazzoli S., Invernizzi C., Marchegiani L., Mattioni L. & Cello G. 2004. Brittle-ductile shear zone evolution and fault initiation in limestones, Monte Cugnone (Lucania), southern Apennines, Italy. In: *Transport and Flow Processes in Shear Zones* (Alsop I. & Holdsworth R.E., eds.), ***Geological Society, London, Special Publications***, Vol. **224**, 353-373.

Biographical Sketch

AMITABH MISHRA
mishra@vt.edu
(540) 231-9689

Electrical & Computer Engineering Department
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0435

PROFESSIONAL PREPARATION

University of Illinois	Computer Science	Master of Science, 1996
McGill University	Electrical Engineering	Doctor of Philosophy, 1985
McGill University	Electrical Engineering	Master of Engineering, 1982
Indian Institute of Technology	Electrical Engineering	Master of Technology, 1975
Jabalpur University	Electrical Engineering	Bachelor of Engineering, 1973

PROFESSIONAL POSITIONS

2000 – Present	Virginia Tech, Associate Professor, Dept. of Electrical & Computer Engg.
2000 – May'00	Illinois Institue of Technology, Chicago, Adjunct Faculty
1987- July'00	Bell Laboratories, Member of Technical Staff, Naperville, Illinois
1987-1987	Adjunct Assistant Professor, University of Pittsburgh
1980-1986	McGill University, Research Assistant, CAD Lab

Research Interests: Wireless Ad hoc, Cellular and Sensor Networks, Telecommunications

PUBLICATIONS

Most closely related to proposed project:

[1] P. Papadimitratos, A. Mishra, and D. Rosenburgh, "Designing a Sensor Network Protocol Stack: a MAC-PHY Cross-Layer Approach to Enhance the 802.15.4 Performance", submitted to IEEE Infocom 2005

[2] P. Papadimitratos, A. Mishra, "Enhancing the IEEE 802.15.4 Performance", Submitted to IEEE VTC 2005

[3] Dewasurendra, D. & Mishra, A., "Design Challenges in Energy Efficient Medium Access Control for Wireless Sensor Networks", "Handbook of Wireless Sensor Networks", M. Ilyas, Editor, CRC Press, April 2004, pages 28.1 - 28.25

[4] Dewasurendra, D. & Mishra, A., "Scalability of a Scheduling Scheme for Energy Aware Sensor Networks", Journal of Wireless Communications and Mobile Computing, Vol. 4, April 2004, pp. 1 -15

[5] Raghuwanshi, S. & Mishra, A., A Traffic-Adaptable Algorithm for Increased Energy-efficiency and Scalability in Wireless Sensor Networks, Proc. Of IEEE RAWCON'03, Boston, August 2003, pp. 225-

Other significant publications:

[6] S. Sankaranarayanan and A. Mishra, "Enhancing the spectrum utilization in the cellular band: A study of GSM – Ad-hoc inter-working," Brazilian Journal of Communications, 2004 – to appear.

[7] S. Sankaranarayanan and A. Mishra, "A multi-channel MAC protocol for wireless cellular - Ad-hoc inter-working," submitted to VTC 2005.

[8] S. Sankaranarayanan and A. Mishra, "A multi-channel MAC protocol for wireless cellular - Ad-hoc inter-working," submitted to Infocom poster session 2005.

[9] Mishra, A., Nadkarni, K, and Patcha, A., "Intrusion Detection in Wireless Ad hoc Networks", IEEE Wireless Communications, Vol. 11, February 2004, pp. 48-60

[10] Nadkarni, K, & Mishra, A., "'A Novel Intrusion Detection Approach for Wireless Ad hoc Networks' presented during IEEE Wireless Communications and Networking Conference 2004 (WCNC'04)

Synergistic activities:

- Regularly teach the Wireless Networks and Computer Networks Courses" (open to computer engineering as well as computer science majors)

Collaborators and Other Affiliations:

Panos Papadimitritos (Cornell), Arun Phadke (Virginia Tech), Joseph Dove (Virginia Tech), P. R. Kumar (UIUC), Raj Jain (Ohio State), Satish Tripathi (University of Buffalo), Rakesh Kapania (Virginia Tech), Arun Somani (Iowa State), G. Manimaran (Iowa State), Luiz Da Silva (Virginia Tech), Keith Holbert (Arizona State), Anura Jayasumana (Colorado State), Sandeep Shukla (Virginia Tech), Matt Mouldon (Virginia Tech), Lamine Milli, Yilu Liu

Graduate advisor: Prof. K.B. Menon (IIT Kharagpur) Prof. Prithviraj Baneerjee (University of Illinois), Prof. Peter Silvester (McGill)

Thesis and Postdoctoral advisees: Dr. P. Papadimitritos, (Ph. D., Cornell), Post-Doctoral Advisee Srivatsan Sankarnarayanan, YunHee Cho, Ashok Sahu, Thesis Advisee

Biographical Sketch

BISWARUP MUKHOPADHYAY Virginia Bioinformatics Institute, Washington Street
biswarup@vt.edu Virginia Polytechnic Institute and State University
(540) 231-8015 Blacksburg, VA 2406

PROFESSIONAL PREPARATION

University of Calcutta, India	Chemistry	B.Sc. (Honors), 1973
Jadavpur University, Calcutta, India	Food Tech and Biochem Engg	B. Tech., 1978
University of Iowa, Iowa City, IA	Microbiology	M.S., 1987
University of Iowa, Iowa City, IA	Microbiology	Ph. D., 1993
University of Illinois, Urbana, IL	Microbiology	Post-Doctoral Training, 1993-2001

APPOINTMENTS:

Research Assistant Professor (**own laboratory**), Virginia Bioinformatics Institute, Virginia Polytechnic Institute and State University	2001-current
Adjunct Assistant Professor, Departments of Biochemistry and Biology, Virginia Polytechnic Institute and State University, Blacksburg, VA	2001-current
Visiting Scientist, Department of Microbiology, University of Illinois, Urbana, IL	2001
Senior Research Scientist, Department of Microbiology, University of Illinois	1995 - 2000
Research Associate, Department of Microbiology, University of Illinois	1993 - 1995
Graduate Research Assistant, Department of Microbiology, University of Iowa	1984 - 1993
Biochemical Engineer, Hindustan Antibiotics Ltd., Pimpri, Pune, India	1982 -1983
Assistant Engineer, Hindustan Antibiotics Ltd., Pimpri, Pune, India	1980 - 1982
Management Trainee, Hindustan Antibiotics Ltd., Pimpri, Pune, India	1978 - 1980

PUBLICATIONS, 22 PUBLISHED (13 SINCE 1998)

5 publications most closely related to the proposed project

1. **Mukhopadhyay, B.,** E. F. Johnson, and R. S. Wolfe. 1999. Reactor-scale cultivation of the hyperthermophilic methanarchaeon *Methanococcus jannaschii* to high cell densities. Appl. Environ. Microbiol. **65**:5059-5065.
2. **Mukhopadhyay, B.,** E. F. Johnson, and R. S. Wolfe. 2000. A novel p_{H_2} control on the expression of flagella in the hyperthermophilic strictly hydrogenotrophic methanarchaeaon *Methanococcus jannaschii*. Proc. Natl. Acad. Sci. U. S. A. **97**:11522-11527.
3. Fàbrega, C., M.A. Farrow, **B. Mukhopadhyay,** V. de Crécy-Lagard, A.R. Ortiz, and P. Schimmel. 2001. A new aminoacyl tRNA synthetase whose sequence fits into neither of the two known classes. Nature **411**:110-114.
4. Patel, H.M., J.L. Kraszewski, and **B. Mukhopadhyay**. The phosphoenolpyruvate carboxylase from *Methanothermobacter thermautotrophicus* has a novel structure. J. Bacteriol. **2004**; **186**:5129-5137
5. Guss, A.M., **B. Mukhopadhyay**, J.-K. Zhang, W. W. Metcalf. **2005**. Genetic analysis of *mch* mutants in two *Methanosarcina* species demonstrates multiple roles for the methanopterin-dependent C-1 oxidation/reduction pathway and differences in H_2 metabolism between closely related species. Mol. Microbiol. (in press)

5 other significant publications

1. **Mukhopadhyay, B.,** E. Purwantini, T. D. Pihl, J. N. Reeve, and L. Daniels. 1995. Cloning, sequencing, and transcriptional analysis of the coenzyme F_{420}-dependent methylene-5,6,7,8-tetrahydromethanopterin dehydrogenase gene from *Methanobacterium thermoautotrophicum* strain Marburg and functional expression in *Escherichia coli*. J. Biol. Chem. **270**:2827-2832.
2. **Mukhopadhyay, B.,** S. F. Stoddard, and R. S. Wolfe. 1998. Purification, regulation, and molecular genetic and biochemical characterization of pyruvate carboxylase from *Methanobacterium thermoautotrophicum* strain ΔH. J. Biol. Chem. **273**: 5155-5166.
3. **Galagan, J. E., et al.** 2002**.** The genome of *M. acetivorans* reveal extensive metabolic and physiological diversity. Genome Res. **21**: 532-542.
4. **Mukhopadhyay, B., E. M. Concar, and R. S. Wolfe.** 2001. A GTP-dependent vertebrate-type phosphoenolpyruvate carboxykinase from *Mycobacterium smegmatis*. J. Biol. Chem. **276**:16137-45.

5. **Mukhopadhyay, B., E. Purwantini, C. L. Kreder, and R. S. Wolfe.** 2001. Oxaloacetate synthesis in the methanarchaeon *Methanosarcina barkeri*: pyruvate genes and a putative *E. coli*-type bifunctional botin protein ligase gene (*bpl/birA*) exhibit a unique gene organization. J. Bacteriol. **183**:3804-3810.

SYNERGISTIC ACTIVITIES

Editotrial: Member, Editorial Review Board, *Archaea***,** 2003-4; Ad-hoc reviewer, Archaea, European Journal of Biochemistry, Biochemistry, Nucleic Acid Research, Biotechnology Progress, Canadian Journal of Microbiology, Environmental Science & Technology,

Grant Review Panel and Advisory Service: Member, NASA Astrobiology Grant Review Panel, 2003; Biotechnology & Biological Sciences Research Council (BBSRC), U.K. (Ad-hoc reviewer); Consultant for the development of Bioinformatics Infrastructure at the Center for Structural Biology, Wake Forest University School of Medicine, 2003-

Invited Presentations: The Institute for Genomic Research, Maryland-2004; Wake Forest University, Department of Biochemistry- 2004; Virginia Tech, Department of Biology, Blacksburg, VA–2002, Institut Teknologi Bandung (ITB), Bandung, Indonesia- 2002, University of Wisconsin, Department of Bacteriology, Madison, WI – 2002, Center of Marine Biotechnology, University of Maryland Biotechnology Institute, Baltimore, MD- 2001, National University of Singapore, Department of Microbiology- 2001, Universitas Surabaya, Surabaya, Indonesia- 2001, Institut Teknologi Bandung (ITB), Bandung, Indonesia- 2001, The Ohio State University, Columbus, OH- 2001, Southern Illinois University, Carbondale, IL- 1997**,** Virginia Polytechnic Institute and State University, Blacksburg, VA–1992, Max Planck Institute for Terrestrial Microbiology, Marburg, Germany–1992

Thesis Experience: Thesis Experience: 1 Graduate Thesis, Biochemistry (in progress), Ph.D Committee member (3 students at the Virginia Tech, since 2002; 1 student, 1995-1999, University of Illinois, Urbana, IL), 5 Undergraduate Microbiology Theses; 2 Undergraduate Biochemistry Theses

Mentoring Experience: 25 undergraduate students (15 women, 2 minorities) (12 during postdoctoral work) - Microbiology, Biochemistry and Cell Biology (several received one or more competitive fellowships; two were awarded NSF fellowship for graduate studies); 1 high school student (1 woman); 1 Graduate Student – Biochemistry 1 woman); Research Technicians (6); Engineers and industrial technicians (30).

Other Experiences, Activities and Professional Memberships:

Industrial Experience with Biological Reactors, Hindustan Antibiotics Ltd., Pune, India, 1978-1983

Member, The American Society for Microbiology, 1984 -

Member, The University of Iowa Patent Committee, 1988 – 1989

Co-director and Faculty member, Annual Fermentation Microbiology Workshop, American Type Culture Collection, Rockville, MD, 1989 – 1998

Developed and taught an intensive/hands-on course in Fermentation Technology: Microbial Engineering, University of Illinois, Urbana, IL, 1994–1995

Provided research materials (cell samples/purified specialty coenzymes) and helped others on the techniques for work with methanogenic archaea (especially *Methanococcus jannaschii*) and for use of reactors in microbiological research, 1993

COLLABORATORS & OTHER AFFILIATIONS

Collaborators:

- William W. Metcalf, Department of Microbiology, University of Illinois, Urbana, IL
- Paul Schimmel*,* The Scripps Research Institute, La Jolla, CA
- Ralph S. Wolfe, Department of Microbiology, University of Illinois, Urbana, IL
- Endang Purwantini, Virginia Bioinformatics Institute, Virginia Tech
- Robert Blankenship and Christopher Staples, Arizona State University, AZ
- Robert F. Tabita, The Ohio State University, Columbus, OH
- Zvi Kelman, Center for Advanced Research in Biotechnology, University of Maryland

Graduate and Postdoctoral Advisors:

- M.S. and Ph.D. Thesis: Lacy Daniels, Department of Microbiology, University of Iowa
- Postdoctoral: Ralph S. Wolfe; Department of Microbiology, University of Illinois

LAWRENCE C. MURDOCH

Associate Professor of Geology and Environmental Engineering and Science
Department of Geological Sciences, Box 341908,
Clemson University, Clemson, SC 29634
lmurdoch@clemson.edu, 864-654-8996

PROFESSIONAL PREPARATINO

Ph.D. University of Cincinnati, 1991, Geological Sciences

M.S. University of Cincinnati, 1987, Civil Engineering/Environmental Science

M.S. University of Cincinnati, 1983, Geological Science

B.S. Penn State University, 1980, Geology

PROFESSIONAL EXPERIENCE

Clemson University, 2002-present, *Associate Professor* of Geological Sciences

FRx Inc., 1994-present, *President*

Clemson University, 1997-2002, *Assistant Professor* of Geological Sciences

University of Cincinnati, Center for Geoenvironmental Science and Technology, 1990-1996, *Director of Research*.

University of Cincinnati, Center for Geoenvironmental Science and Technology, 1986-1990, *Geohydrology Group Leader*.

Research Interests: **Fractures in geologic materials, fluid flow and deformation, field experiments involving excavation**

PUBLICATIONS

1. Murdoch, L.C. and L. Germanovich. Analysis of a deformable fracture intersecting a well. *International Journal of Numerical and Analytica Methods in Geomechanics*, in review.
2. Murdoch, L.C., Richardson, J.R., Q. Tan, S. Malin. Forms and sand transport in shallow hydraulic fractures in residual soil, *Canadian Geotechnical Journal*, in review
3. Bradner, G. and L.C. Murdoch. Effects of skin and hydraulic fractures on the performance of an SVE well. *Journal of Contaminant Hydrology*. in press
4. Murdoch, L.C. and W.W. Slack. 2002. Forms of hydraulic fractures in shallow, fine-grained formations. *Journal of Geoenvironmental and Geotechnical Engineering*. v. 128, no. 6, p. 479-487.
5. Murdoch, L.C. 2002. Mechanical analysis of an idealized hydraulic fracture at shallow depths. *Journal of Geoenvironmental and Geotechnical Engineering*. v. 128, no. 6, p. 488-495.
6. Murdoch, L.C. and others. Remediation of organic chemicals in the vadose zone, in *Vadose Zone, Science and Technology Solutions*. Chapter 7. pp 948-1247. R.Falta and B. Looney eds. Battelle Press, 2000.

7. Uber, J.G. and L.C. Murdoch. Evaluation of hopscotch method for transient groundwater flow. *J. Hydrau. Eng.*, ASCE, v. 126, n. 8, August 2000, p. 615-626.
8. Chen, J-L. and Murdoch, L.C. In-situ electroosmosis between horizontal electrodes: a field test. *J. Geotech. and Geoenviron. Eng.*, v. 125, no. 12, 1090-1100. 1999.
9. Murdoch, L.C. Forms of hydraulic fractures created during a field test in fine-grained glacial drift, Quarterly Journal of Engineering Geology, 28, 23-35, 1995.
10. Murdoch, L.C. Hydraulic fracturing of soil during laboratory experiments: a.) Methods and observations; b.) propagation; c.) theoretical analysis. Geotechnique, 43(2), 255-265, 266-276, 277-287 1993.

SYNERGISTIC ACTIVITIES AND AWARDS

- Award for Faculty Excellence, Clemson , 1999 and 2002
- Development of a 5-week Hydrogeology Field Course, Clemson University.
- *NSF Engineers and Scientists in the Schools*, Presentation to Pickens County Middle School, 2001
- Professional Geologist, Indiana, 1992, No. 1421
- Development of an innovative course integrating mathematical techniques and geological processes.

RECENT COLLABORATORS

Leonid Germanovich, Georgia Tech
Bruce Carter, Cornell
Robert Siegrist, Colorado School of Mines
Mike Roulier, USEPA
Bill Slack, FRX Inc.
Rick Johnson, Oregon Graduate Institute

GRADUATE STUDENTS

Jiann-Long Chen, Ph.D.	Allen Wolf, M.S.	Qingfeng Tan, M.S.
Phil Hart, M.S.	Susan Kelly, M.S.	James Henley, M.S.
Jeff Dunlap. M.S.	Vasi Passinos. M.S.	James Richardson, M.S.
Chapman Ross, M.S.	Graham Bradner, M.S.	Todd Schweisinger, Ph.D
Allison Craig	Erik Svenson, M.S.	Richard Hall, M.S.
Marc McGowan, M.S.	Robert Workman, M.S.	Shaun Malin, M.S.

GRADUATE ADVISORS

Arvid Johnson, Purdue University (for M.S. and Ph.D. in Geology)
Herb Preul, University of Cincinnati (for M.S. in Environmental Science)

Biographical Sketch

LOTHAR OBERAUER Physik Department E15
Lothar.oberauer@ph.tum.de Technische Universität München
+49(0)89-28912509 James-Franck-Str 1, 85748 Garching

PROFESSIONAL PREPARATION

Technische Universität München	Physics	Diplom, 1985
Technische Universität München	Physics	Ph.D., 1988
Technische Universität München	Physics	Habil., 1995

PROFESSIONAL POSITIONS

Professor, TU München	2002-present
Project Manager Borexino, INFN Italy	2000-2002
Deputy Professor, Univ. Bayreuth	1996-1997
Assistant Professor, TU München	1995-1996
EU Fellow, INFN Italy	1994-1995
Akademischer Rat, TU München	**1988-1994**

Research Interests: Astroparticle physics, neutrino physics, proton decay, geophysics.

PUBLICATIONS

List of 10 publications most pertinent to this proposal:

1. "Neutrino Physics", L. Oberauer, Nuclear Physics News, accepted for publication (2005).
2. "Letter of Intent for Double-CHOOZ: A search for the mixing angle Theta 13", F. Ardellier et al. (Double-Chooz Coll.), hep-ex/0405032 (2004).
3. "Low Energy Neutrino Physics after SNO and KamLAND ", L. Oberauer, Modern Physics Letters A, Vol. 19, No. 5 (2004).
4. "Production of Light Concentrators for BOREXINO and its Counting Test Facility", L. Oberauer, C. Grieb, F. von Feilitzsch, I. Manno, Nucl. Instr. & Meth. A530, 453 (2004).
5. "Low Energy Neutrino Astronomy", L. Oberauer, Proc. to Neutrino Oscillations in Venice, Venice, Italy, Dec. (2003).
6. "A Large Liquid Scintillator Detector for Low Energy Astronomy", L. Oberauer, Proc. to TAUP 2003, Seattle, USA, Sept. (2003).
7. "New limits on nucleon decays into invisible channels with the Borexino Counting Test Facility", H. Back et al. (Borexino Coll.), Physics Letters B 563, 23 (2003).
8. "Measurements of extremely low radioactivity levels in BOREXINO", H. Back et al. (Borexino Coll.), Astroparticle Physics 18, 1 (2002).
9. "Coherent Neutrino Nucleus Scattering", L. Oberauer, Prog. Part. Nucl. Phys. 48, 301, (2002)
10. "Science and Technology of Borexino: A Real Time Detector for Low Energy Solar Neutrinos", H. Back et al. (Borexino Coll.), Astroparticle Physics 16, 205 (2002).

Vita

Sandip Pakvasa
Born: December 24, 1942, Bombay, India (U.S. citizen)

Address:

Department of Physics & Astronomy
University of Hawaii
2404 Correa Road
Honolulu, HI 96822

Degrees:

1966 Ph.D.	Purdue University
1957 M. Sc., M.S.	University of Baroda, Baroda, India
1954 B. Sc., M.S.	University of Baroda, Baroda, India

Position Held:

1965-67	Research Associate	Syracuse University, Syracuse
1967-68	Associate Physicist	University of Hawaii at Manoa
1968-70	Assistant Professor	University of Hawaii at Manoa
1970	Visiting Scientist	Tata Institute of Fundamental Research, Bombay
1970-74	Associate Professor	University of Hawaii at Manoa
1974-	Professor	University of Hawaii at Manoa
1975	Visiting Member	Institute for Advanced Study, Princeton
1978	Visiting Professor	University of Wisconsin, Madison
1982	Scientific Associate	CERN, Geneva
1983	Visiting Professor	Tata Institute of Fundamental Research, Bombay
1983	Visiting Scientist	KEK, National Laboratory for High Energy Physics, Japan
1985	Visiting Professor	KEK, National Laboratory for High Energy Physics, Japan
1986	Visiting Professor	University of Melbourne, Melbourne, Australia
1986	Visiting Professor	University of Wisconsin, Madison
1989	Visiting Professor	KEK, National Laboratory for High Energy Physics, Japan
1996	McMinn Lecturer	Vanderbilt University
2002	Visiting Professor	KEK, National Laboratory for High Energy Physics, Japan

Fellowships/Awards:

1976	Elected to Fellowship of American Physical Society
1981	Awarded a Fellowship by Japan Society for Promotion of Science
1985	Awarded a Fellowship by Japan Society for Promotion of Science

Selected List of Publications

1. Neutrinos of Non-zero Mass, Phys. Rev. Lett. 28, 1415 (1972), with K. Tennakone.
2. Muon and Electron Number Nonconservation in a V-A Gauge Model, Phys. Rev. Lett. 38, 937 (1977), with B.W. Lee, R. Shrock and H. Sugawara.
3. Consequences of Majorana and Dirac Mass Mixing for Neutrino Oscillations, Phys. Rev. Lett. 45, 692 (1980), with V. Barger, P. Langacker and J. Leveille.
4. Matter Effects in Three Neutrino Oscillations, Phys. Rev. D22, 2718 (1980), with V. Barger, R. Phillips and K. Whisnant.
5. Probing the Nature of the Neutrino: The Boron Solar Neutrino Experiment, Phys. Rev. D37, 849 (1988), with R.S. Raghavan.
6. Neutrino Mass and Mixing Implied by Underground Deficit of Muon Neutrino Events, Phys. Lett. B207, 79 (1988), with J.G. Learned and T. Weiler.
7. Bimaximal Mixing of Three Neutrinos, Phys. Lett. B437, 107(1998), with V. Barger, T.J. Weiler and K. Whisnant.
8. Neutrino Decay and Atmospheric Neutrinos, Phys. Lett. B462, 109(1999), with V. Barger, J. G. Learned, P. Lipari, M. Lusignoli and T. J. Weiler.
9. First Results from Kamland:Evidence for Reactor Neutrino Disappearance, Phys. Rev. Lett. 90, 021802(2003), with the Kamland Collaboration.
10. A High Sensitivity Search for Anti-Nu_{es} from the Sun and Other Sources at Kamland, Phys. Rev. Lett. 92, 071303 (2004), with the Kamland Collaboration.
11. Measurement of Neutrino Oscillation with Kamland: Evidence of Spectral Distortion, hep-ex/0406035, Phys. Rev. Lett. (in press), with T. Araki et al.

Collaboration: Member of KamLand Collaboration, Member of INO Collaboration, Member of HANOHANO Collaboration

Graduate Advisor: S. P. Rosen, Purdue University

Postdoctoral Advisor: E. C. G. Sudarshan, Syracuse University

Thesis and Postdoctoral Advisees: K. Tennakone, T. Brown, X-G. He, A. Acker, A. Datta. H. Paes, J. Ferrandis, J. Pantaleone.

Biographical Sketch

Wayne D. Pennington Chair and Professor of Geophysical Engineering
wayne@mtu.edu Department of Geological and Mining Engineering and Sciences
(906) 487-2531 Michigan Technological University, Houghton, MI 49931

PROFESSIONAL PREPARATION

Princeton University	Geology and Geophysics	A.B., 1972
Cornell University	Geophysics	M.S., 1976
University of Wisconsin-Madison	Geophysics	Ph.D., 1979

PROFESSIONAL POSITIONS

Chair, Michigan Tech	2002-present
Professor, Michigan Tech	1994-present
Advanced Senior Research Scientist, Marathon Oil Company	1985-1994
Assistant Professor, University of Texas at Austin	1979-1985

Research Interests: Seismic properties of earth materials; flow, stress, and fluids in rocks;

PUBLICATIONS

Most closely related to proposed project:

1. Beresnev, Igor A., W. D. Pennington, and Roger M. Turpening, (2004 submitted) Capillary-physics mechanism of elastic-wave mobilization of residual oil, submitted and tentatively accepted (with some editing yet to be approved) for publication in Geophysics.
2. Pennington, W. D., (2005, in press) "Reservoir Geophysics" chapter in the Petroleum Engineering Handbook, to be published by the Society of Petroleum Engineers.
3. Acevedo, H., and W. D. **Pennington**, (2003) Porosity and lithology prediction at Caballos Formation in the Puerto Colon Oil Field in Putumayo (Colombia) The Leading Edge, 22, 1135-1141.
4. **Pennington**, Wayne D., H. Acevedo, J. I. Haataja, and A. Minaeva, (2001) Seismic Time-lapse surprise at Teal South: that little neighbor reservoir is leaking, The Leading Edge, 20, 1172-1175.
5. **Pennington**, W. D. (1997), Seismic petrophysics: an applied science for reservoir geophysics, The Leading Edge, March, 241-244.
6. Wood, J.R., J.R. Allan, J.E. Huntoon, W.D. **Pennington**, W.B. Harrison, E. Taylor, C.J. Tester (1996), Horizontal Well taps bypassed Dundee oil in Crystal Field, MI, Oil and Gas Journal, Oct. 21, 60-64 *and* Horizontal well success spurs more Devonian work in Michigan, Oil and Gas Journal, Oct. 28, 86-90.
7. **Pennington**, W. D. and D. P. Edwards (1994), Integrating well log data, drilling data, and laboratory data for the determination of maximum drawdown limits in the presence of weak sands, SPE 28453, Society of Petroleum Engineers, proceedings, 69th Annual Technical Conference and Exhibition, 937-945.
8. Paillet, F. L., C.H. Cheng, and W. D. **Pennington** (1992), Acoustic Waveform Logging - Advances in Theory and Application, The Log Analyst, 33, 239-258.
9. Davis, S.D., and W.D. **Pennington** (1989), Induced seismic deformation in the Cogdell oil field of West Texas, Bull. Seism. Soc. Am., 70, 1477-1494.
10. **Pennington**, W.D. (1983), The role of shallow phase changes in the subduction of oceanic crust, Science, 220, 1045-1047.

Synergistic activities:

- Integration of reservoir engineering, reflection seismology, and rock physics
- Teach courses in reflection seismology; formation evaluation and reservoir engineering; and quantitative reservoir characterization
- Teach short courses worldwide in Seismic Petrophysics (rock properties from seismic data)
- Former First Vice-President of the Society of Exploration Geophysicists (SEG)
- Current liaison of SEG to American Geological Institute (AGI)
- Member of AGI's Government Affairs (standing) and its International (ad hoc) committees

Collaborators and Other Affiliations:

Horacio Acevedo, Igor Beresnev, Josh Haataja, Shawn Len, Colin MacBeth, Anastasia Minaeva
Honorary Professor in the Petroleum Engineering Department, Heriot-Watt University (Edinburgh, UK)

Graduate advisor: the late Dr. Robert P. Meyer, University of Wisconsin

Thesis and Postdoctoral advisees: Sean Wagner (current), David Forel (current), Sean Trisch (current), Doug Moore (2004, current affiliation in transition), Christopher Schmidt (2004, current affiliation in transition), Horacio Acevedo (2002, currently with Ecopetrol, Colombia), Aaron Green (2002, currently with a youth ministry), Anastasia Minaeva (2001, currently at Shell Exploration), Dan Brugeman (2000, currently with Duke Energy), Josh Haataja (2000, currently with Rock Solid Images), Terra Lutch (1998, recently with Marathon Oil Company; currently self-employed), Nick Popko (1996, unknown), John Curchin (1985, unknown), Scott Adamek (1984, unknown), G. Van Burbach (1984, unknown), James McLaren (1983, unknown)

SUSAN M. PFIFFNER
Center for Environmental Biotechnology, University of Tennessee
10515 Research Drive, Suite 300, Knoxville, Tennessee 37932-2575
Office: (865) 974-8031, Fax: (865) 974-8027, Email: pfiffner@utk.edu

A. PROFESSIONAL PREPARATION
University of Tulsa, Tulsa, Oklahoma, Natural Science, B.S. 1982
University of Oklahoma, Norman, Oklahoma, Microbiology, M.S. 1985
Florida State University, Florida, Biological Sciences, Ph.D. 1991

B. PROFESSIONAL EXPERIENCE
2000-present, Research Assistant Professor, Department of Microbiology, University of Tennessee
1994-1999, Research Associate, Center for Environmental Biotechnology, University of Tennessee
1993-1994, Post-doctoral Associate, Environmental Science Division, Oak Ridge National Laboratory
1992-1993, Post-doctoral Associate, University of Tennessee, Center for Environmental Biotechnology

C. PUBLICATIONS (32 as of November 2004, > 80 Presentations)

1. Pfiffner, S. M., A.V. Palumbo, G. Sayles and D. Gannon. 2004. Microbial population and degradation activities changes monitored during chlorinated solvent biovent demonstration. Ground Water Monitoring and Remediation. 2(3):102-110.

2. Onstott, T.C., D.P. Moser, S.M. Pfiffner, J.K. Fredrickson, F.J. Brockman, T.J. Phelps, D.C. White, A. Peacock, D. Balkwill, R. Hoover, L. Krumholz, M. Borscik, T. Kieft and R. Wilson. 2003. Indigenous and contaminated microbes in ultradeep mines. Environmental Microbiology, 5:1168-1191.

3. Moser, D.P., T.C. Onstott, J.K. Fredrickson, F.J. Brockman, D.L. Balkwill, G.R. Drake, S.M. Pfiffner, D.C. White, K. Takai, L.M. Pratt, J. Fong, B. Sherwood-Lollar, G. Slater, T.J. Phelps, N. Spoelstra, M. DeFlaun, G. Southam, A.T. Welty, B.J. Baker, and J. Hoek. 2003. Temporal shifts in Microbial Community Structure and Geochemistry of an Ultradeep South African Gold Mine Borehole. Geomicrobiol. J, 20:517-548.

4. Pfiffner, SM, PA Sobecky, TJ Phelps, and AV Palumbo. 2002. Microbiology of Atlantic Coastal plain aquifers and other unconsolidated subsurface sediments. In Gabriel Bitton (Ed.) Encyclopedia of Environmental Microbiology. Vol. 4, pp. 2028-2042. John Wiley & Son, Inc. New York, NY.

5. Takai, K, DP Moser, TC Onstott, N Spoelstra, SM Pfiffner, A Dohnalkova and JK Fredrickson. 2001. *Alcaliphilus auruminutor* gen. nov., sp. nov., an Extremely Alkaliphilic Bacterium Isolated from a Deep South African Gold Mine. Int. J. Syst. Evol. Microbiol. 51: 1245-1256.

D. SYNERGISTIC ACTIVITIES
1. The PI was an integral member of an interdisciplinary team composed of academia, industry and national laboratory members involved with the In Situ Bioremediation Demonstration at the Savannah River Site. During this project, the PI along with several other investigators developed a non-polar gas phase phosphate addition for bioremediation. The Apparatus and Method for Phosphate-Accelerated Bioremediation (PHOSter) were patented in 1/5/96 (Patent # US 5480549) and 5/19/1998 (Patent # US 05753109), and the PI was a co-recipient of 1996 R&D 100 Award. PHOSter technology has been licenced by 30 companies and has be used for cleanup in nine states.

2. As a member of the Remediation Technology Development Forum, the PI provided innovative research and transferred technologies developed under DOE programs. The technologies were applied to three different types of bioremediation efforts for chlorinated solvent contamination at Dover Air Force Base in Delaware. Presently, the PI provides assistance to on-going studies by providing technical reviews.

3. As part of an international, interdisciplinary NSF Life in Extreme Environments Project and NASA Astrobiology Institute (NAI), the PI examined biogeochemcial processes from the ultradeep gold mines (2miles below the surface) in South Africa. The PI was one of the few women to have ever worked in the gold mines. The PI obtained samples, coordinated sample processing and shipped samples to over 15 collaborative labs and universities for continued characterization of enriched extremophiles. Data and results from these collaborations were presented at the several international meetings. The PI has organized and held interdisciplinary multi-national research experiences for undergraduates (1 to 7 week duration) in South Africa (2001-2004). As education and outreach lead for the NAI, the PI has provided astrobiology workshop opportunities for regional high school teachers and has presented hands-on activities at the Tennessee Science Teacher Association and at the Knox County Science Teachers In-Service Day.

4. Since 1998, the PI serves as a member of the Science Advisory Committee for the Integrated Petroleum Environmental Consortium (IPEC). The committee provides recommendations on proposals submitted by Oklahoma and Arkansas Universities. Proposals address ways to increase the competitiveness of the domestic petroleum industry through a reduction in the costs of compliance with U.S. environmental regulations.

5. The PI organizes a biannual hands-on science workshop to mentor 12-13 year old girls. During the SHared ADventures in Engineering and Science (SHADES) workshop the PI provides the girls a role model, engages the girls with fun activities on biological science, and encourages them into careers in science.

E. Collaborators & Other Affiliations

(i) PI-level Collaborators and Co-authors - Almeida., J., University of Lisbon, Portugal; Balkwill, D.L., Florida State University; Boone, D., Portland State University; Brandt, C.C. Oak Ridge National Laboratory (ORNL); Brockman, F., Pacific Northwest National Laboratory (PNNL); DeFlaun, M., Geosyntech, Inc.; Franz, T., Franz and Associates; Fredrickson, J.K., PNNL; Gannon, D.J., Zeneca Corp.; Ghiorse, W.C., Cornell University; Hazen, T.C., Lawrence Berkeley National Laboratory; Kieft, T., New Mexico Tech.; Kotelnikova, S., University of Göteborg, Sweden; Krumholtz, L., University of Oklahoma; Macnaughton, S. AEA Tech. Env.: Marsh, T.L., University of Michigan; Mikula, C. Dover Air Force Base; Moser, D.P., Murphy, E., Murray, C.J., PNNL; Onstott, T.C., Princeton University; Palumbo, A.V., ORNL; Peacock, A., University of Tennessee; Pedersen, K., University of Göteborg, Sweden; Phelps, T.J., ORNL; Pratt, L., Indiana University; Sayler, G, UTK; Sayles, G., U.S. EPA-Cincinnati; Schryver, J., ORNL; Sherwood-Lollar, B., University of Toronto, Canada; Sobecky, P. Georgia Tech.; Southam, G., University of Western Ontario, Canada; Sublette, K., University of Tulsa; Takai, K., PNNL; Watson, D.B., ORNL; White, D.C., UTK; Zhang, C., Savannah River Ecology Laboratory; Zhou, J.-Z.,ORNL.

(ii) Graduate and Post Doctoral Advisors - McInerney, M., University of Oklahoma; Balkwill, D.L., Florida State University; White, D.C., UTK; Palumbo, A.V., ORNL

(iii) Thesis Advisor and Postgraduate-Scholar Sponsor – Served/ing on M.S. committees for: A.E. Biernacki, A. Coleman; serving on Ph.D. committee for J Chang.

Tommy J. Phelps
Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6036,
Ph: 865-574-7290, FAX: 865-576-8543, email: phelpstj@ornl.gov

A: PROFESSIONAL PREPARATION
University of Wisconsin, Madison, WI. Ph.D. 1979-1985, Bacteriology.
Virginia Polytechnic Institute & State University, Blacksburg, VA. M.S. 1975-1977, Microbiology.
Indiana University, Bloomington, IN. B.A. 1971-1975, Chemistry and Biology.

B: RECENT PROFESSIONAL EXPERIENCE
2003- Distinguished Research Staff, Microbiologist, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN
1999- Senior Research Scientist, Environmental Sciences Division, Oak Ridge National Laboratory
February 1992-: Microbiologist, Environmental Sciences Division, Oak Ridge National Laboratory
January 1986-1992: Research Associate, Institute for Applied Microbiology, Univ. of TN, Knoxville,
1984-1986: Post doc research assistant, Department of Biological Science, Florida State U., Tallahassee,

C: PUBLICATIONS (>115 as of Feb., 2005. Plus > 130 Abstracted Presentations and >80 Invited talks)
Most closely related publications:
Onstott, TC, D.P. Moser, J.K. Fredrickson, F.J. Brockman, S. M. Pfiffner, T.J. Phelps, D.C. White, A. Peacock, D. Balkwill, R. Hoover, L.R. Krumholz, M. Borscik, T.L. Kieft and R.B. Wilson. 2003. Indigenous versus contaminant microbes in ultradeep mines. Environmental Microbiology. 5 1168-1191.

Moser, D. P., T.C. Onstott, J.K. Fredrickson, F.J. Brockman, D.L. Balkwill, G. Drake, S. Pfiffner, D.C. White, K. Takai, L.M. Pratt, J. Fong, B. Sherwood Lollar, G. Slater,T.J. Phelps, N. Spoelstra. M. DeFlaun, G. Southam, A. Welty, B. Baker, and J. Hoek. 2003. Temporal shifts in microbial community structure and geochemistry of an ultradeep mine borehole after isolation. Geomicrobio. J. 20:517-548.

Roh, Y., S.V. Liu, G. Li, H. Huang, T.J. Phelps, and J. Zhou. 2002. Isolation and Characterization of Metal-reducing Thermoanaerobacter Strains from Deep Subsurface Environments of the Piceance Basin, Colorado. App. Environ. Microbiol.68: 6013-6020.

Onstott, T.C., T.J. Phelps, F.Colwell, D. Ringelberg, D.C. White, and D. Boone. 1998. Observations pertaining to the origin and ecology of microorganisms recovered from the deep subsurface of Taylorsville Basin VA. Geomicrobiol J. 15: 353-385.

Phelps, T. J., and J. K. Fredrickson. 2001. Drilling, coring and sampling subsurface environments. In: Manual of Environmental Microbiology (M. McInerney ed.) ASM Press. pp. 679-696.95.

Other publications:
Zatsepina, O., D. Riestenberg, S. McCallum, M. Gborigi, C. Brandt, B.A. Buffett, and T. J. Phelps. 2004. Influence of water thermal history and overpressure on CO2-hydrate nucleation and morphology. American Mineralogist. 89:1254-1259.

Riestenberg, D., O. R. West, S. Lee, S. McCallum, and T. J. Phelps. 2003. Sediment Surface Effects on Methane Hydrate Formation and Dissociation. Marine Geology. 198: 181-190.

Roh, Y., C. Zhang, H. Vali, R.J. Lauf, J. Zhou, and T. J. Phelps. 2003. Biogeohemical and environmental factors on iron biomineralization: magnetite and siderite formation. Clays and Clay Minerals. 51: 83-95.

Phelps, T. J., A. V. Palumbo, A. S. Beliaev. 2002. Metabolomics and microarrays for improved understanding of phenotypic characteristics controlled by both genomics and environmental constraints. Current Opinion in Biotechnology. 13:20-24.

Phelps, T.J., D. J. Peters, S. L. Marshall, V. Alexiades, G. K. Jacobs, J. G. Blencoe, M. T. Naney, J. L. Heck and O. R. West. 2001. A new Experimental facility for investigating the formation and properties of gas hydrates under simulated seafloor conditions. Review of Scientific Instruments, 72 1514-1521.

D. SYNERGISTIC ACTIVITIES

i. AWARDS:

ORNL, Lockheed Martin, Inventor's Award, (Received two) 1999
ORNL, Lockheed Martin, Technical Achievement Award, 1998
Environmental Sciences Division, Scientific Achievement Award, 1997
R&D 100 Award, 1996. Co-recipient of award for PHOSter, related to a patent in 1996.
U. S. DOE Certificates of Appreciation. 1991 and 1994.

ii. SERVICE:

Deep Underground Science and Engineering Laboratory committees (NUSEL, NESS, DUSEL) 2002-
Mentor for NSF/NASA funded workshops and REU in S. Africa 1998-2004
NSF-JOIDES-ODP United States. Science Advisory Committee (USSAC) 2000-2002
NSF- JOIDES-ODP Deep Biosphere Planning Group committee member. 1997-2000
NSF -JOIDES-ODP Gas Hydrate Planning group liaison. 1998-2000
Participant in Planetary Protection and sampling workshops for NASA, Ames Laboratory. 1997-2000
Working Group Coordinator for the Taylorsville Triassic Basin, DOE/OHER-SSP,1993-1996
Participant in Aseptic Drilling, Sample Handling, and Tech Transfer Workshops. DOE/OHER 1992-1994
Adjunct Associate Professor of Chemical Engineering or Dept of Geology, Univ. of Tennessee, 1991-
Editorial Board, J. Microbiol. Methods and reviewer for several additional journals, 1990-
Participant in Task Summary Group for WSRS Integrated TCE Demonstration,1990-1994

iii. PATENTS. Four granted and one pending, two in process.

2002. Mixed Oxide nanoparticles and method of making. R.J. Lauf, T.J. Phelps, C. Zhang and Y. Roh. Granted, 9-2002. Patent number 6,444,453.
2001. Position sensitive radioactivity detector for gas and liquid chromatorgraphy. J. L. Cochran, J. F. McCarthy, A. V. Palumbo and T. J. Phelps. Patent granted 6-2001. Patent number 6,229,146
1996. Plus a Continuation-in-Part 1997. Apparatus and method for phosphate-accelerated bioremediation. BB Looney, TC Hazen, SM Pfiffner,TJ Phelps, KH Lombard and JW Borthen. Patent number 5,480,549.

E. COLLABORATORS.

i. More than 400 co-authors from more than 100 institutions and more than a dozen countries. Representative names are similar to those on CV's of Pfiffner, Kieft and Onstott.

ii. Graduate and Postdoctoral Advisers- RE Benoit, Ms Advisor at VaTech; JG Zeikus Ph.D. advisor at U. Wisconsin; DC White, Postdoctoral Advisor at FSU and UTK.

iii. Thesis and postgraduate sponsor:

Postdoctoral: C. Low, C. Zhang, S. Liu, Y. Roh, S. Marshall, O. Zatsepina, K.S. Cho, J.W. Moon
PostMs: R. Mazumder, J. Logan, B. Kinsall, Y. Deng, D. Peters, S. Fisher, D. Riestenberg, S. McCallum
Graduate Students: J. Niedzielski, A. Arrage, K. Malachowsky, V. Korde, O. Webb, L. Lackey, L. O'Connor, D. Riestenberg.

Biographical Sketch

James D. Phillips J.D.,Ph.D.

Dr. Phillips is currently the Director of the Conflict Resolution Institute at the L. Douglas Wilder School of Government and Public Affairs at Virginia Commonwealth University at Richmond, Virginia. The Institute specializes in providing a wide range of conflict and dispute resolution services to federal, state and local government agencies that are engaged in citizen participation processes to minimize public opposition to proposed public projects. The Institute also provides services to citizens seeking to provide input and comment on proposed public projects and programs.

Dr. Phillips is a former Assistant Attorney General of Virginia and has over 15 years of experience in resolving protracted policy and legal issues involving the public. He has directed numerous teams providing professional strategic communications services for legislative bodies at the state and local levels of government. His projects have ranged from managing a National Stakeholder Forum for the United States Department of Defense for establishing military base closure protocol to directing the Virginia Department of Transportation's Citizen Participation Project for its long range multi modal planning process.

Dr. Phillips holds a Ph.D. in Public Administration from the University of Colorado and is a frequent speaker around the country in the area of citizen involvement in the public policy arena. His design and implementation of a public forum and dialogue process in Chesterfield County, Virginia was awarded the Virginia Municipal League's 2000 Presidential Award for outstanding public management practice.

Biographical Sketch

MARK L. PITT
pitt@vt.edu
(540) 231-3015

Physics Department, Robeson Hall
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0435

PROFESSIONAL PREPARATION

California Institute of Technology	Physics	B.S., 1985
Princeton University	Physics	M.A., 1987
Princeton University	Physics	Ph.D., 1992

PROFESSIONAL POSITIONS

Associate Professor, Virginia Tech	2002-present
Assistant Professor, Virginia Tech	1997-2002
Senior Research Fellow, Caltech	1995-1996
Robert Millikan Research Fellow, Caltech	1992-1995

Research Interests: parity-violating electron scattering, neutrino physics, UCN experiments.

PUBLICATIONS

Most closely related to proposed project:

1. "The Strange Quark Contribution to the Proton's Magnetic Moment", D.T. Spayde, D.H. Beck, R. Hasty, T. Averett, D. Barkhuff, G. Dodson, K. Dow, M. Farkhondeh, W. Franklin, E. Tsentalovich, B. Yang, T. Zwart, E.J. Beise, H. Breuer, R. Tieulent, R. Carr, S. Covrig, B.W. Filippone, T.M. Ito, R.D. McKeown, W. Korsch, S. Kowalski, B. Mueller, M.L. Pitt, M.J. Ramsey-Musolf, Phys. Lett. **B583**, 79 (2004).
2. "Parity-Violating Electron Deuteron Scattering and the Proton's Neutral Weak Axial Form Factor", T. M. Ito, T. Averett, D. Barkhuff, G. Batigne, D.H. Beck, E.J. Beise, A. Blake, H. Breuer, R. Carr, B. Clasie, S. Covrig, A. Danagoulian, G. Dodson, K. Dow, D. Dutta, M. Farkhondeh, B.W. Filippone, W. Franklin, C. Furget, H. Gao, J. Gao, K. Gustafsson, L. Hannelius, R. Hasty, A.M. Hawthorne-Allen, M. C. Herda, C. E. Jones, P. King, W. Korsch, S. Kowalski, S. Kox, K. Kramer, P. Lee, J. Liu, J.W. Martin, R. D. McKeown, B. Mueller, M. L. Pitt, B. Plaster, G. Que´me´ner, J.-S. Re´al, J. Ritter, J. Roche, V. Savu, R. Schiavilla, J. Seely, D. Spayde, R. Suleiman, S. Taylor, R. Tieulent, B. Tipton, E. Tsentalovich, S. P.Wells, B. Yang, J. Yuan, J. Yun, and T. Zwart, Phys. Rev. Lett. **92**, 102003 (2004).
3. "Measurement of the Electric Form-Factor of the Neutron at $Q^2 = 0.5$ and 1.0 GeV^2/c^2", G . Warren, *et al. ,* (The JLAB E93-026 Collaboration), Phys. Rev. Lett. **92**, 042301 (2004).
4. "Strange Magnetism and the Anapole Structure of the Proton", R. Hasty, A.M. Hawthorne-Allen, T. Averett, D. Barkhuff, D.H. Beck, E.J. Beise, A. Blake, H. Breuer, R. Carr, S. Covrig, A. Danagoulian, G. Dodson, K. Dow, M. Farkhondeh, B.W. Filippone, J. Gao, M.C. Herda, T.M. Ito, C.E. Jones, W. Korsch, K. Kramer, S. Kowalski, P. Lee, R.D. McKeown, B. Mueller, M. Pitt, J. Ritter, J. Roche, V. Savu, D.T. Spayde, R. Tieulent, E. Tsentalovich, S.P. Wells, B. Yang, and T. Zwart, Science **290** (2000) 2117.
5. "Parity-Violation in Elastic Electron-Proton Scattering and the Proton's Strange Magnetic Form Factor", D.T. Spayde, T. Averett, D. Barkhuff, D.H. Beck, E.J. Beise, C. Benson, H. Breuer, R. Carr, S. Covrig, J. DelCorso, G. Dodson, K. Dow, C. Eppstein, M. Farkhondeh, B.W. Filippone, P. Frasier, R. Hasty, T.M. Ito, C.E. Jones, W. Korsch, S. Kowalski, P. Lee, E. Maneva, K. McCarty, R.D. McKeown, J. Mikell, B. Mueller, P. Naik, M. Pitt, J. Ritter, V. Savu, M. Sullivan, R. Tieulent, E. Tsentalovich, S.P. Wells, B. Yang, and T. Zwart, Phys. Rev. Lett. **84** (2000) 1106.

Other significant publications:

1. "Measurement of the vector analyzing power in elastic electron-proton scattering as a probe of the double virtual Compton amplitude", S.P. Wells, T. Averett, D. Barkhuff, D.H. Beck, E.J. Beise, C. Benson, H. Breuer, R. Carr, S. Covrig, J. DelCorso, G. Dodson, C. Eppstein, M. Farkhondeh, B.W. Filippone, T.A. Forest, P. Frasier, R. Hasty, T.M. Ito, C. Jones, W. Korsch, S. Kowalski, P. Lee, E. Maneva, K. McCarty, R.D. McKeown, J. Mikell, B. Mueller, P. Naik, M.L. Pitt, J. Ritter, V. Savu, D.T. Spayde, M. Sullivan, R. Tieulent, E. Tsentalovich, S.P. Wells, B. Yang, and T. Zwart, Phys. Rev. C **63** (2001) 064001.
2. "Electron Beam Position Stabilization with a Piezoelectric Optical Correction System", T. Averett, C.E. Jones, R.D. McKeown, M. Pitt, Nucl. Instrum. Meth. **A438** (1999) 246.
3. "Measurement of the Proton's Neutral Weak Magnetic Form Factor", B. Mueller, D.H. Beck,E.J. Beise, E. Candell, L. Cardman, R. Carr, R.C. DiBari, G. Dodson, K. Dow, F. Duncan, M. Farkhondeh, B.W. Filippone, T. Forest, H. Gao, W. Korsch, S. Kowalski, A. Lung, R.D. McKeown, R. Mohring, J. Napolitano, D. Nilsson, M. Pitt, N. Simicevic, B. Terburg, and S.P. Wells, Phys. Rev. Lett. **78** (1997) 3824.
4. "An Energy Feedback System for the MIT-Bates Linear Accelerator Center", D.H. Barkhuff, S.P. Wells, T. Averett, D.H. Beck, E.J. Beise, D. Cheever, G. Dodson, S. Kowalski, R.D. McKeown, B.A. Mueller, M. Pitt, D. Spayde, C. Tschalaer, A.Zolfaghari, Nucl. Instrum. Meth. **A450** (2000) 187.
5. "A High Power Liquid Hydrogen Target for Parity Violation Experiments", E.J. Beise, D.H. Beck, E. Candell, R. Carr, F. Duncan, T. Forest, W. Korsch, J.W. Mark, R.D. McKeown, B.A. Mueller, M. Pitt, S. Wells, Nucl. Instrum. Meth. **A378** (1996) 383.

Synergistic activities:

- Regularly teach the particle physics section of the "Highlights of Contemporary Physics Course" (open to all majors)
- Faculty advisor to the Virginia Tech Sigma Pi Sigma Physics Honor Society

Collaborators and Other Affiliations:

SAMPLE: listed above in publications list items 1, 2, 4, 5
G0: G. Franklin, B. Quinn, D. Armstrong, T. Averett, J.M. Finn, K. Griffioen, K. McFarlane, J. Arvieux, L. Bimbot, X. Grave, R. Sellem, C. Furget, S. Kox, G. Quemener, J. Real, K. Johnston, N. Simicevic, S. Wells, V. Papvassiliou, S. Pate, R.D. Carlini, A.F. Lung, D.J. Mack, W.F. Vulcan, S.A. Wood, C. Yan, C.A. Davis, D.H. Beck, A.M. Nathan, S. Williamson, W. Korsch, J. Birchall, W.R. Falk, L. Lee, S.A. Page, W.D. Ramsey, W.T.H. vanOers, E.J. Beise, H. Breuer, P. Roos, E. Korkmaz, H. Mkrtchyan, S. Stepanyan, V. Tadevosyan
UCN Neutron A experiment: Brad Filippone, Bob McKeown, Takeyasu Ito, Jeff Martin, Thomas Bowles, Gary Hogan, Chris Morris, Andy Saunders, Steve Lamoreaux, Susan Seestrom, Albert Young, Alejandro Garcia, Bruce Vogelaar, Mark Makela
QWEAK: D. Armstrong, T. Averett, J. Birchall, J.D. Bowman, R. Carlini, C.A. Davis, S. Chattopadhyay, J. Dunne, J. Erler, R. Ent, W. Falk, M. Finn, T. Forest, D. Gaskell, C. Hagner, W. Hersman, M. Holtrop, K. Johnston, R. Jones, C. Keppel, E. Korkmaz, S. Kowalski, L. Lee, A. Lung, D. Mack, S. Majewski, H. Mrktchyan, G. Mitchell, N. Morgan, A. Opper, S. Page, S. Penttila, M. Pitt, M. Poelker, T. Porcelli, W.D. Ramsey, M. Ramsey-Musolf, J. Roche, N. Simicevic, G. Smith, R. Suleiman, S. Taylor, W.T.H. vanOers, S. Wells, S. Wilburn, S. Wood, C. Zorn

Graduate advisor: Prof. Frank Calaprice, Princeton University

Postdoctoral advisor: Prof. Robert D. McKeown, Caltech

Thesis and Postdoctoral advisees: Riad Suleiman 2004 – present, Junho Yun 2001- 2004, Alice Hawthorne-Allen 1999-2001, Johannes Ritter 1999

Biographical Sketch

JEAN-CLAUDE ROEGIERS

jroegiers@ou.edu
(405) 325-6787

Mewbourne School of Petroleum
and Geological Engineering
The University of Oklahoma
Norman, Oklahoma 73019-1014

PROFESSIONAL PREPARATION

Université de Liège, Belgium	Ing.Civil des Constructions	B.Sc., 1969
University of Minnesota……..	Geo-Engineering	Ph.D., 1973

PROFESSIONAL POSITIONS

McCasland Chair & Professor, U.of Oklahoma	1988-present
Founder & Director, Fracturing Fluid Facility, OU	1992-1994
Founder & Director, Rock Mechanics Institute, OU	1991-1999
Senior Research Scientist, Dowell Schlumberger	1982-1991
Associate Professor, U.of Toronto	1979-1982
Assistant Professor, U.of Toronto	1974-1979
Staff member, Los Alamos Scientific Laboratories	1972-1979

Research Interests: Rock Mechanics, 'Problem-reservoirs', Borehole stability, Completion and Production, Fluid/rock interactions

PUBLICATIONS

Most closely related to proposed project

1. *"Dual-porosity Elastoplastic Analyses of Non-isothermal One-dimensional Consolidation"*, Zhang, J., Roegiers, J.-C. and Bai, M., Geotech.and Geol.Eng.J., vol.22, pp-589-610, 2004.
2. *"Well Modeling: an Overview"*, Roegiers, J.-C., Oil & Gas Science and Technology, Rev.IFP, in 'Geomechanics in Reservoir Simulation', Editions Technip, vol.57, nb.5, pp.1-12, 2002.
3. *"Managing Technology – Cost-efficient Drilling Operations:How to Achieve Best Value from your Technical Resources"*, Roegiers, J.-C., Sanchez, M., Vásquez, A.R., Ramones, M., Sulbarán, A. and Poquioma, W., J.Oil and Gas Executive, vol.3, nb.2, pp.20-23, 2000.
4. *"Thermoelastic Analysis of Fluid-saturated Porous Media"*, Bai, M., Bouhroum, A. and Roegiers, J.-C., Erd und Erdgas Kohle, 116 Jahrgang, Heft 1, pp.1-13, 2000.
5. *"Permeability Tensors of Anisotropic Fracture Networks"*, Chen, M., Bai, M. and Roegiers, J.-C., Math.Geology, vol.31, pp.355-373, 1999.

Other significant publications:

6. *"A Complete Plane Strain Fictitious Stress Boundary Element Method for Poroelastic Media"*, Ghassemi,A., Cheng, A.H.-D., Diek, A. and Roegiers, J.-C., J.Eng.Anal.Boundary Elements, vol.25, pp.41-48, 2001.
7. *"Building a Knowledge – Efficient Sand Advisor"*, Kanj, M.Y., Zaman, M.M. and Roegiers, J.-C., KBS J., Elsevier Science, vol.12, nb.4, pp.145-158, 1999.
8. *"Time-dependent Failure Analysis of Inclined Boreholes in Fluid-saturated Formations"*, Cui, L., Abousleiman, Y., Cheng, A.H.-D. and Roegiers, J.-C., J.Energy Resour.Tech., ASME, 1999.
9. *"Numerical Modeling of Flow and Deformation in Fractured Rock Specimens"*, Bai, M., Meng, F., Elsworth, D., Abousleiman, Y., and Roegiers, J.-C., Int.J.Num.Analy.Math.Geomech., vol.23, pp.141-160, 1999.
10. *"Acoustic Velocity Signatures Associated with Rock Deformation Processes"*, Scott, T.B., Roegiers, J.-C. and Zaman, M.M., SPE39403, Distinguished Authors Series, pp.70-75, J.of Pet.Tech, 1998.

Synergetic activities:

- Regularly teach introductory and advanced classes to industry on 'Geomechanics solutions to field problems'.
- Consulting on 'Problem Reservoirs', i.e. reservoirs that do not respond to traditional treatments.

Collaborators and Other Affiliations:

- Honoray Professorship at China University of Geosciences in Wuhan and at Heibei Architectural U.of Science and Technology in Haidan, PRC
- Founding member of American Rock Mechanics Association

Graduate Advisor: Prof.Charles Fairhurst, University of Minnesota

Thesis and Dissertation advisees:

- M.Sc. degrees, U.of Toronto: 9 Ph.D. degrees, U.of Toronto: 3
- M.Sc. degrees, U.of Oklahoma: 19; Ph.D. degrees, U.of Okla.: 18
- Currently: M.Sc.: 3; Ph.D.: 2

BIOGRAPHICAL SKETCH

Kate Scholberg

Department of Physics
Duke University
Box 90305
Durham, NC 02139

Phone: (919) 660-2962
Fax: (919) 660-2525
E-Mail: schol@phy.duke.edu
URL: http://www.phy.duke.edu/∼schol

Professional Preparation

Ph.D., Physics	1997	California Institute of Technology (advisor: Charles W. Peck)
Thesis:		*A search for neutrinos from gravitational collapse with the MACRO experiment*
M.S., Physics	1991	California Institute of Technology
B.Sc., Physics, First Class Honors	1989	McGill University, Montreal

Professional Appointments

2004-present	Assistant Professor of Physics, Duke University
2000-2004	Assistant Professor of Physics, Massachusetts Institute of Technology
1996-2000	Research Associate in Physics, Boston University

Awards and Grants

- NSF CAREER Award, 2004
- Department of Energy Outstanding Junior Investigator Award, 2003
- NSF award for SNEWS (SuperNova Early Warning System), 2003-2005
- MIT Mitsui Career Development Chair, 2002-2004
- MIT Charles E. Reed Faculty Initiatives Fund Award, 2002

Selected Publications

"Evidence for an oscillatory signature in atmospheric neutrino oscillation", Y. Ashie *et al.*, Phys. Rev. Lett. 93 (2004) 101801.

"Indications of neutrino oscillation in a 250 km long baseline experiment", M. H. Ahn *et al.*, Phys. Rev. Lett. 90 (2003) 041801. hep-ex/0103001

"Detection of accelerator produced neutrinos at a distance of 250 km", S.H. Ahn *et al.*, Phys. Rev. Lett. B511 (2001) 178. hep-ex/0103001

"Neutrino Physics: Status and Prospects", K. Scholberg, Proceedings of 2003 Lake Louise Winter Institute. hep-ex/0308011

"SNEWS: The SuperNova Early Warning System", P. Antonioli *et al.*, New J. Phys., 6 (2004), 114. astro-ph/0406214

"Evidence for oscillation of atmospheric neutrinos", Y. Fukuda *et al.*, Phys. Rev. Lett. 81 (1998) 1562. hep-ex/9807003

BIOGRAPHICAL SKETCH

"Study of the atmospheric neutrino flux in the multi-GeV energy range",
Y. Fukuda *et al.*, Phys. Lett. B436, (1998) 33. hep-ex/9805006

Synergistic Activities

- SNOLAB Experiment Advisory Committee, 2004-present.
- Organizing committee of New England Particle Physics Retreat for graduate students, 2002, 2003.
- Writer and reviewer of GRE Physics test items for Educational Testing Service, 2003.
- Popular lecture "Neutrinos from the Sky and Through the Earth": Jennifer Mills lectureship at Kalamazoo College, 2003; MIT Science and Engineering Program for Teachers, 2003
- Organizing committee of Japanese-American Frontiers of Science Symposium, 2001.
- Developer of high school "Saturday Academy" neutrino physics workshops at B.U. for high school students and teachers (1999-2000).
- Popular articles in *American Scientist* May/June 1999, Jan/Feb 2005, and in *Muse* magazine for children, January 2000.

Collaborations and Other Affiliations

Collaborators:

- The T2K (Tokai to Kamioka) collaboration, since 2004
- The Alpha Magnetic Spectrometer collaboration, 2000-2004
- The K2K (E362) collaboration, since 1999
- The Super-Kamiokande collaboration, since 1996
- The MACRO collaboration, since 1990
- Coordinator of SNEWS working group, since 1998

Graduate Advisors: Charles W. Peck, Barry C. Barish (Caltech)

Postdoctoral Advisors: Lawrence R. Sulak, James L. Stone, Edward Kearns (Boston University)

Graduate Advisees: Ronnie Misra (MIT M. Eng. 2002), Gianpaolo Carosi (MIT Ph.D. candidate)

S. LLYN SHARP
Virginia Tech; Department of Geosciences; Blacksburg, VA; 24061; 540-231-4080; llyn@vt.edu

PROFESSIONAL PREPARATION
Middle Tennessee State University, Geology, B.S. 1977
Virginia Polytechnic Institute & State University (Virginia Tech), Instructional Technology and Systems Design, M.A.Ed. 1990

APPOINTMENTS
Outreach Coordinator, Department of Geosciences **2004-present**
Virginia Polytechnic Institute & State University, Blacksburg, VA

Assistant Director, Museum of Natural History **1990-2004**
Virginia Polytechnic Institute & State University

Management Consultant, Virginia Power Technologies, Inc. (VPT) **1994-97**
Blacksburg, Virginia

Research and Technical Specialist, Department of Geosciences **1980-1991**
Virginia Polytechnic Institute & State University

Lab Technician, Department of Agronomy **1980-81**
Virginia Polytechnic Institute & State University

Soils and Cartographic Technician, Soil Conservation Service, USDA **1979-80**
Skyland Soil and Water Conservation District, Asheville, NC

PUBLICATIONS
Sharp has led over 200 workshops, conference presentations, and short courses; her professional positions have required materials development and many presentations, but not publications of the type requested here.

Taylor, Frank, A. Raflo, and L. Sharp. 1997. *The MINTS Book: Model Inquiries into Nature in the Schoolyard: Inquiry Field Guide to the Natural History of Southwestern Virginia Schoolyards*. Virginia Tech Museum of Natural History. 290 pp.

Casey, Denny and Llyn Sharp. 2004. "Watershed Investigations using GLOBE Hydrology Protocols Workshop". National Association of Science Teachers Conference. December, 2004.

Museum of Geosciences "Early Life from China". 2005. Led a collaborative effort with faculty and graduate students to produce an exhibit for the Tucson International Gem and Mineral Show.

Sharp, Llyn. 2003. "Community Outreach Programs for Water Researchers". Virginia Water Research Symposium, Program and Abstracts, October 2003.

SYNERGISTIC ACTIVITIES
Sharp is a founding member of VT-STEM, a university-wide outreach initiative in Science, Technology, Engineering and Math (STEM). VT-STEM taps Virginia Tech resources to enhance K-12 STEM education. VT-STEM also seeks to increase STEM literacy for non-technical audiences.

Sharp is an instructor and serves on the Project Staff for Virginia Tech's Summer Training Academy for Rising Students (VT-STARS), a science and technology institute for disadvantaged high school students from Southside Virginia. Students *and their teachers* participate in on-campus learning followed by after-school activities in their home communities.

Sharp developed the VT Science Outreach Program's Education Resource Center, a growing collection of hands-on science kits and other teaching materials available for loan to educators.

Sharp is certified as a trainer in 12 national environmental education programs including: Global Learning and Observations to Benefit the Environment (**GLOBE**), National Project WET: Water Education for Teachers **(WET)**, National and Virginia Save Our Streams **(SOS).** In addition, she serves as the Southwest Virginia regional partner and training coordinator for both GLOBE and SOS.

She is also a NASA Moon Rock and Meteorite certified borrower.

Sharp has a history of community involvement, including board membership on watershed organizations and work with Community Disaster and Emergency Response programs.

COLLABORATORS AND OTHER AFFILIATIONS

Co-authors and co-presenters:
Brand, B, Virginia Tech School of Education; Brown, S, Virginia Save Our Streams; Casey, D, Virginia Museum of Natural History; Eriksson, S, Virginia Tech Museum of Natural History, now at UNAVCO; Fox, E, Virginia Tech Department of Computer Science; Glasson, G, Virginia Tech School of Education; Marouf, S, Virginia Tech Crop and Soil Environmental Sciences; McPherson, E, Virginia Tech Educational Technologies; Rosenzweig, M, Virginia Tech Department of Biological Sciences; Younos, T, Virginia Water Resources Research Center;

Graduate Advisors:
Head, T; Magliaro, S; Moore, J; Moore, M, all of Virginia Tech College (now School) of Education

no graduate students

Biographical Sketch

STEFAN M. SPANIER
spanier@utk.edu
(865) 670-9085

Department of Physics and Astronomy
University of Tennessee
Knoxville, TN 37996-1200

PROFESSIONAL PREPARATION

University of Mainz, Germany	Physics	Diploma, 1991
University of Mainz, Germany	Physics	Ph.D., 1994

PROFESSIONAL POSITIONS

Assistant Professor, University of Tennessee	2002 - present
Research Fellow at SLAC	1998-2002
Research Fellow at CERN	1994-1998

Research Interests: CP violation and Physics beyond Standard Model in quark sector, exotic hadrons, neutrino physics.

PUBLICATIONS

Most closely related to proposed project:

1. DIRC dreams: research directions for the next generation of internally reflected imaging counters, Blair N. Ratcliff and Stefan Spanier, Nucl.Instr. and Methods A433, 456, (1999).
2. First year operational experience with the Cherenkov detector (DIRC) of BaBar, I. Adam et al. (DIRC collaboration), IEEE Trans.Nucl.Sci. 47, 793, (2000).
3. Measurement of the Decays B→φK and B →φK*, B.Aubert et al. (B aBar collaboration), Phys.Rev.Lett. 87, 151801, (2001).
4. A high resolution silicon strip beam telescope, C. Amsler et al. (CMS pixel), Nucl.Instr. and Methods A480, 501, (2002).
5. Measurement of the time-dependent CP asymmetry in the $B^0 \rightarrow \phi K^0$ decay, B. Aubert et al. (BaBar collaboration), Phys.Rev.Lett.93, 071801, (2004).

Other significant publications:

1. Coupled channel analysis of anti-p p annihilation into pi0 pi0 pi0, pi0 eta eta, and pi0 pi0 eta, C. Amsler et al. (Crystal Barrel), Phys.Lett. B355, 425, (1995).
2. Antiproton-proton annihilation at rest into Kl K+ pi-, S.Spanier, Nucl.Phys. B 56A, 281, (1997); A. Abele et al. (Crystal Barrel collaboration), Phys.Rev. D57, 3860, (1998).
3. The scalar mesons, Stefan Spanier and Nils Tornqvist, Review of Particle Physics, S. Eidelman et al, Phys.Lett. B 592, 1, (2004).
4. Photon background in DIRC fused silica bars, K. Yarritu, S. Spanier, and J. Va'vra, IEEE Trans.Nucl.Sci. 49, (2002).
5. Observation of direct CP violation in B0→K+ pi- decays, B. Aubert et al. (BaBar collaboration), Phys.Rev.Lett. 93, 131801, (2004).

Synergistic activities

- Initiated the seminar for fundamental physics together with Prof. Yuri Kamyshkov at the University of Tennessee.

- Faculty advisor to the College of Arts and Science of University of Tennessee.
- Take part in the student project to build cosmic ray telescope in University and surrounding High Schools (TECOP).

Collaborators and Other Affiliations:
Crystal Barrel collaboration: A.Abele et al., earlier publications are C.Amsler et al.
CMS pixel collaboration: C.Amsler, K. Bosiger, M. Glattli, R. Kaufmann, F. Ould-Saada, C. Regenfus, P. Riedler, S. Spanier
BaBar collaboration: B. Aubert et al.

Graduate Advisor: Prof. Eberhard Klempt, University of Mainz.

Postdoctoral advisor: Prof. Claude Amsler, University of Zürich, Switzerland.
Prof. David Leith, Stanford University, CA.

Thesis and Postdoctoral advisees: M. Heinzelmann (1998), M. Krishnamurthy (2002 – present), G. Ragghianti (2003 – present).

Biographical Sketch

TATSU TAKEUCHI
takeuchi@vt.edu
(540) 231-5333

Physics Department, Robeson Hall
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0435

PROFESSIONAL PREPARATION

University of Tokyo	Physics	B.S. (1983), M.S. (1985)
Yale University	Physics	M.S. (1988), M.Phil. (1988), Ph.D. (1989)

PROFESSIONAL POSITIONS

Associate Professor, Virginia Tech	2003-present
Assistant Professor, Virginia Tech	1997-2003
Scientific Attachee, CERN	1995-1996
Research Associate, Fermilab	1992-1995
Research Associate, SLAC	1989-1992

Research Interests: Physics beyond the Standard Model; precision electroweak physics; models of neutrino masses and mixings.

PUBLICATIONS

1. "Theory of Neutrinos", APS Multidivisional Neutrino Study – Theory Discussion Group Report, R. N. Mohapatra, et al. (hep-ph/0412099).
2. "The NuTeV Anomaly, Lepton Universality, and Non-Universal Neutrino-Gauge Couplings", W. Loinaz, N. Okamura, S. Rayyan, T. Takeuchi, and L. C. R. Wijewardhana, Phys. Rev. D**70**, 113004 (2004).
3. "Quark-Lepton Unification and Lepton Flavor Non-Conservation from a TeV-scale Seesaw Neutrino Mass Texture", W. Loinaz, N. Okamura, S. Rayyan, T. Takeuchi, and L. C. R. Wijewardhana, Phys. Rev. D**68**, 073001 (2003).
4. "The NuTeV Anomaly, Neutrino Mixing, and a Heavy Higgs Boson", W. Loinaz, N. Okamura, T. Takeuchi, and L. C. R. Wijewardhana, Phys. Rev. D**67**, 073012 (2003).
5. "Indirect Probes of New Physics", J. L. Hewett, T. Takeuchi, and S. Thomas, Chapter 10 of 'Electroweak Symmetry Breaking and New Physics at the TeV Scale', edited by T. L. Barklow et al. (World Scientific, 1997) [hep-ph/9603391].
6. "Constraints on Gauged B-3L_tau and Related Theories", L. N. Chang, O. Lebedev, W. Loinaz, and T. Takeuchi, Phys. Rev. D**63**, 074013 (2001).
7. "Universal Torsion-Induced Interaction from Large Extra Dimensions", L. N. Chang, O. Lebedev, W. Loinaz, and T. Takeuchi, Phys. Rev. Lett. **85**, 3765 (2000).
8. "Constraints on Two-Higgs Doublet Models at Large tan\beta from W and Z decay", O. Lebedev, W. Loinaz, and T. Takeuchi, Phys. Rev. D**62**, 055014 (2000).
9. "Constraints on R-parity Violating Couplings from LEP/SLD Hadronic Observables", O. Lebedev, W. Loinaz, and T. Takeuchi, Phys. Rev. D**62**, 015003 (2000).
10. "Constraints on R-parity Violating Couplings from Lepton Universality", O. Lebedev, W. Loinaz, and T. Takeuchi, Phys. Rev. D**61**, 115005 (2000).

Synergistic activities:

- Developed a course module on Special Relativity which makes extensive use of spacetime diagrams instead of the traditional Lorentz transformation formulae thereby letting students understand the material through pictures rather than equations.

Collaborators and Other Affiliations:

Masako Bando (Aichi U.), Sandor Benczik (Virginia Tech), Lay Nam Chang (Virginia Tech), Martin Einhorn (Michigan U.), Djordje Minic (Virginia Tech), JoAnne L. Hewett (SLAC), Masafumi Koike (Virginia Tech), Oleg Lebedev (U. of Bonn), Will Loinaz (Amherst College), Naotoshi Okamura (KIAS), Tetsuya Onogi (YITP), Jonathan L. Rosner (Chicago U.), Joe Sato (Saitama U.), Joseph Slawny (Virginia Tech), Scott Thomas (Stanford U.), L. C. R. Wijewardhana (Cincinnati U.), Koichi Yoshioka (Kyushu U.)

Graduate advisor: Prof. Thomas Appelquist, Yale University

Postdoctoral advisor: Prof. Michael Peskin, SLAC

Thesis and Postdoctoral advisees: Will Loinaz (1997-2000), Naotoshi Okamura (2001-2003), Saifuddin Rayyan (2000-present), Alexey Pronin (2001-present), Masafumi Koike (2004-present).

Biographical Sketch

Werner Tornow Department of Physics
tornow@tunl.duke.edu Duke University and TUNL
(919) 660-2637 Durham, NC 27708-0308

PROFESSIONAL PREPARATION

University of Tübingen	Physics	Diploma, 1967
University of Tübingen	Physics	Dr. rer. nat., 1972
University of Tübingen	Physics	Dr. habil., 1979

PROFESSIONAL POSITIONS

Professor, Duke University	1999-present
Director of Triangle Universities Nuclear Laboratory	1996-present
Research Professor, Duke University	1994-1999
Research Associate Professor, Duke University	1988-1994
Assistant Professor, Duke University	1985-1988
Senior Research Fellow, University of Tübingen	1979-1985

Research Interests: Nuclear Physics with Neutrons and Light Ion Beams, Few-Body Physics, Polarization Phenomena, Fundamental Symmetries, Double-Beta Decay, Neutrino Physics, Monte-Carlo Techniques, Physics with Gamma Rays

PUBLICATIONS

Most closely related to proposed project:

1. T. Araki for the KamLAND Collaboration (including W. Tornow), *Measurement of Neutrino Oscillation with KamLAND: Evidence of Spectral Distortion*, Phys. Rev. Lett. (2005)
2. C.E. Aalseth for the Majorana Collaboration (including W. Tornow), *The Majorana Neutrinoless Double-Beta Decay Experiment*, Physics of Atomic Nuclei, vol. 67 (2004), pp. 2002.
3. K. Eguchi for KamLAND Collaboration (including W. Tornow), *A High Sensitivity Search for anti-neutrinos from the Sun and Other Sources at KamLAND*, Phys. Rev, Lett., vol. 92 (2004), pp. 071301.
4. K. Eguchi for the KamLAND Collaboration (including W. Tornow), *First Results from KamLAND: Evidence for Reactor Antineutrino Disappearance*, Phys. Rev. Lett., vol. 90 (2003), pp. 021802.
5. C.E. Aalseth, for the Majorana Collaboration (including W. Tornow), *Comment of "Evidence for Neutrinoless Double-Beta Decay"*, Mod. Phys. Lett. A, vol. 17 (2002), pp. 1475.

Other significant publications:

1. B.E. Crawford, W.I. Furman, C.R. Howell, E.V. Lychagin, B.G. Levakov, V.I. Litvin, A.E. Lyzhin, E.P. Magda, G.E. Mitchell, A. Yu. Muzichka, G.V. Nekhaev, E.I. Sharapov, V.N. Shvetsov, S.L. Stephenson, A.V. Strelkov, and W. Tornow,

Direct nn-Scattering at the YAGUAR Reactor, Nucl. Instrum. Methods Phys. Res. (2004)

2. E.M. Neidel, W. Tornow, D.E. Gonzalez Trotter, C.R. Howell, A.S. Crowell, R.A. Macri, R.L. Walter, G.J. Weisel, J. Esterline, H. Witala, B.J. Crowe III, R.S. Pedroni, D.M. Markoff, *A New Twist to the Long-Standing Three-Nucleon Analyzing Power Puzzle*, Phys. Lett. B, vol. 552 (2003), pp. 29.
3. W. Tornow, N.G. Czakon, C.R. Howell, A. Hutcheson, J.H. Kelley, V.N. Litvinenko, S.F. Mikhailov, I.V. Pinayev, G.J. Weisel, and H. Witala, *Low-Energy Photodisintegration of the Deuteron and Big-Bang Nucleosynthesis*, Phys. Lett. B, vol. 574 (2003), pp. 8.
4. W. Tornow, E.M. Neidel, D.E. Gonzalez Trotter, C.R. Howell, A.S. Crowell, R.A. Macri, R.L. Walter, G.J. Weisel, J. Esterline, H. Witala, B.J. Crowe III, R.S. Pedroni, and D.M. Markoff, *Electromagnetic Effects and the Long-Standing Three-Nucleon Analyzing Power Puzzle*, Mod. Phys. Lett. A, vol. 18 (2003), pp. 258.
5. H. Witala, J. Golak, R. Skibinski, C.R. Howell, and W. Tornow, *Effects of the Magnetic Moment Interactions in the 3N Continuum*, Phys. Rev. C, vol. 67 (2003), pp. 064002.

Synergistic activities:

1. Vice Chair, American Physical Society, Topical Group on Few-Body Systems and Multiparticle Dynamics (GFB)
2. Editor for Experimental Nuclear Physics, Few-Body Systems, Springer Verlag
3. In charge of Research Experience for Undergraduates (REU) Program at Duke/TUNL
4. Executive Committee of KamLAND Collaboration
5. Executive Committee of Majorana Collaboration

Collaborators and Other Affiliations:

KamLAND Collaboration: K. Inoue, J. Shirai, F. Suekane, A. Suzuki, J. Busenitz, A. Piepke, B.E. Berger, S.J. Freedman, B.K. Fujikawa, K.M. Heeger, K.T. Lesko, K.-B. Luk, H. Murayama, A.W.P. Poon, H.M. Steiner, G.A. Horton-Smith, C. Mauger, R.D. McKeown, P. Vogel, C.E. Lane, P.W. Gorham, G. Guillian, J.G. Learned, S. Matsuno, S. Pakvassa, S. Dazeley, R. Svoboda, B.D. Dieterle, G. Gratta, W. Bugg, Y. Efremenko, Y. Kamyshkov, C.R. Gould, H.J. Karwowski, D.M. Markoff, A.R. Young, Y. –F. Wang

Majorana Collaboration: R. Gaitskell, A. Barabash, V. Brudanin, K. Lesko, K. Vetter, S. Elliott, D. Radford, H. Ejiri, R. Brodzinski, A. McDonald, A. Young, J. Collar, F. Avignone, Y. Efremenko, J. Wilkerson,

DIANNA Collaboration: G.E. Mitchell, W.I. Furman, E.V. Lychagin, A. Yu. Muzichka, G.V. Nekhaev, A.V. Strelkov, E.I. Sharapov, V.N. Shvetsov, B.G. Levakov, V.I. Litvin, A.E. Lyzhin, E.P. Magda, B.E. Crawford, S.L. Stephenson, C.R. Howell

Biographical Sketch

ROGER M. TURPENING
roger@mtu.edu
(906) 487-1784

Department of Geological & Mining Engineering & Sciences
Michigan Technological University
Houghton, Michigan 49931

Professional Preparation

The University of Michigan	Geology	B.S., 1961
The University of Michigan	Geology	M.S., 1963
The University of Michigan	Geology	Ph.D., 1966

Professional Positions

Research Professor, Michigan Technological University	2000-present
Staff, Dept. of Energy, Office of Science, Basic Energy Sciences, Geosciences	2000-2003
Research Assoc. Massachusetts Institute of Technology, Earth, Atmos.,&Planet.	1982-2000
Staff, Lincoln Laboratories, Massachusetts Institute of Technology	1978-1982
Geophysicist, Environmental Research Institute of Michigan	1973-1978
Geophysicist, Willow Run Laboratories-University of Michigan	1967-1973
Post-Doctoral Fellow, Massachusetts Institute of Technology, Earth&Planet. Sci.	1966-1967

Research Interests

Seismic imaging, especially borehole seismic imaging

Publications and Patents

Shear wave generator, Patent No. 4,059,820, granted Nov. 22, 1977

Stewart, R., R. Turpening, M.N. Toksoz, 1981, Study of a subsurface fracture zone by vertical seismic profiling, Geophysical Research Letters, Vol. 8, pp

Turpening, R., 1984, Differential vertical seismic profiling—fracture volume Analysis, Chapter 8 in *Vertical Seismic Profiling* edited by A. Balch and M. Lee, I.H.R.D.C., Boston, Mass.

Turpening, R. and C. Blackway, 1984, Differential vertical seismic profiling—hydrofrac analysis, Chapter 9 in *Vertical Seismic Profiling* edited by A. Balch and M. Lee, I.H.R.D.C., Boston, Mass.

Keho, T., A. Cheng, M.N. Toksoz, and R. Turpening, 1984, Wave dynamics in a Gulf Coast VSP, in *Vertical Seismic Profiling: Advanced Concepts*, edited by M.N. Toksoz and R. R. Stewart, Vol. 14B of Handbook of Geophysical Exploration, series editors K. Helbig and S. Treitel, Geophysical Press, London

Young, T.C., C. Monash, R. Turpening, 1984, Computer modeling of vertical seismic profiling, Geophysical Prospecting, Vol. 32, pp 851-870

Lefeuvre, F., R. Turpening, C. Caravana, A. Born, L. Nicolities, 1993, Vertical open fractures and shear wave velocities derived from VSPs, full waveform acoustic logs, and televiewer data, Geophysics, Vol. 58, pp 818-834

Stephen, R.A., D.E. Koelsch, H. Berteaux, A. Bocconcelli, S. Bolmer, J. Cretin, N. Etourmy, A. Fabre, R. Goldsborough, M. Gould, S. Kerry, J. Laurent, G. Omnes, K. Peal, S. Swift, R. Turpening, and C. Zani, 1994, The seafloor borehole array seismic system (SEABASS), and VLF ambient noise, Marine Geophysical Researches, Vol. 16, pp 243-286

Gibson, R., W. Turpening, A. Born, R. Turpening, 1997, Observations of borehole-source amplitude reduction due to casing, Geophysical Prospecting, Vol. 45, pp 1-20

Acoustic tree and wooden member imaging apparatus, Patent No. 6,347,551 B1, granted February 19, 2002

Biographical Sketch

Dr. Franz Freiherr von Feilitzsch

Education

07/1973	Diploma in Physics (Prof. Paul Kienle) Thesis: *„γ-Faktoren von isomeren Zuständen in ^{94}Mo, ^{91}Nb und ^{91}Zr“*
1967 – 1973	Technische Universität München
1952 – 1966	Abitur (A level/SAT exam) Luitpoldgymnasium München

Professional Positions

1.9.1994 -	Full Professor (chair) – Technische Universität München
5/1989 – 8/1994	Professor (Extraordinarius) – Techn. Universität München
8/1988 – 5/1989	Acad. Director – Technische Universität München
8/1982 – 8/1988	Acad. Senior official – Technische Universität München
1979 – 1982	Scient. Employee – Kernforschungszentrum Karlsruhe
1978 – 1979	Member of staff of Prof. R.L. Mößbauer in Grenoble
1974 – 1979	Scient. Employee – Technische Universität München
12/1977	PhD – (Prof. Paul Kienle) Thesis: *„γ-spektroskopische Untersuchung von Hochspinzuständen mit Schwerionen-Compound-reaktionen und multipler Coulombanregung“*
06/1987	Habilitation (qualification as a university lecturer) Thesis: *„Suche nach Neutrinomassen“*

Biographical Sketch

CHESTER F. WATTS
cwatts@radford.edu
(540) 831-5637

Engineering Geosciences, Curie Hall
Radford University
Radford, VA 24142

PROFESSIONAL PREPARATION

Virginia Polytechnic Inst & State University	Geology	B.S., 1974
Radford University	Physical Sciences	M.S., 1977
Purdue University	Engineering Geology	Ph.D., 1983

PROFESSIONAL POSITIONS

1. University Distinguished Professor, Radford University, appointed 1998
2. Professor of Geology, member of the graduate faculty, Radford University, 1993 to present
3. Richard H. Jahns Distinguished Lecturer, Geological Society of America and the Association of Engineering Geologists, "Natural Hazards and Public Policy," 2003.
4. Congressional Science Fellow, office of U.S. Senator Joseph Lieberman, personal staff; transportation, science, and technology adviser, 2001 to 2002.
5. Founding Director, Institute for Engineering Geosciences, Radford University, 1986 to 2001
6. Associate Professor of Geology, Radford University, 1987 to 1993
7. Tenured, Radford University, spring 1990
8. Assistant Professor of Geology, Radford University, 1984 to 1987
9. Visiting Assistant Professor of Geology, Purdue University, 1982 to 1983
10. Supervisor of Teaching Assistants, Purdue University, 1979 to 1982
11. Instructor of Geology, James Madison University, 1977-79
12. Lecturer in Applied Physics, New River Community College, 1976-77

Research Interests: Rock slope engineering, stability of surface excavations in rock.

PUBLICATIONS

Most closely related to proposed project:

1. Dean, W.T., Watts, C.F., & Seaton ,W.J., 1999, Evaluation of a suspected ancient mass movement using electrical resistivity. Proceedings of the 50th Annual Highway Geology Symposium, Roanoke, Va., May.
2. Fisher, B., Watts, C.F., 1999, Multi-disciplined Geological Approach to Delineate and Predict Petroleum Migration within Bedrock and Structured Soils. (abs.): Proceedings of the 42nd Annual Meeting of the Association of Engineering Geologists, Salt Lake City, Utah, September.
3. Kastning, E.H., and Watts, C.F., 1997, Allogenic recharge to karst from valley-train alluvium and colluvium in the central Appalachian region: in The Engineering Geology and Hydrogeology of Karst Terranes, Beck & Stephenson (eds), Balkema, Rotterdam. ISBN 90 5410 867 3.
4. Whisonant, R.C., and Watts, C.F., 1995, Problems, projects and professionals: a new course in erosion and sediment control (abs.): proceedings of the 1995 annual meeting of the Association of Engineering Geologists, Sacramento, CA, Oct 2-8.
5. Whisonant, R.C., Phillips, J.D., and Watts, C.F., 1992, Legal and environmental aspects of sedimentation (abs.): Virginia Journ. of Science, v. 43, p. 266.

Other significant publications:

1. Watts, C.F. 2000. ROCKPACK III Computer Software and User's Manual, next generation of software for the analysis of safety and stability of rock excavations, RockWare, Inc., Golden, Colorado, www.rockware.com.

2. Watts, C.F., 1987, Microcomputer software for comprehensive stability analyses of potential rockslides, in Landslides of Eastern North America, U.S. Geological Survey Circular 1008, U.S. Government Printing Office, pp. 38-39.
3. Watts, C.F. and Frizzell, E.M., 1987, A preliminary look at simple back analysis of rock slope stabilities utilizing microcomputers: Proceedings of the 38th Annual Highway Geology Symposium, Pittsburgh, PA, May, pp. 42-49.
4. Watts, C.F. and West, T.R., 1986, Discontinuity significance index and electronic data collection for rock slope stability studies, Bulletin of the Association of Engineering Geologists, Aug., vol XXIII, pp. 256-277.
5. Watts, C.F. and West, T.R., 1985, Electronic notebook analysis of rock slope stability at Cedar Bluff, Virginia, Bulletin of the Association of Engineering Geologists, Feb., vol XXII, pp. 67-85.

Synergistic activities:

Watts has (1) served as a national distinguished lecturer for the Geological Society of America and the Association of Engineering Geologists; (2) served as a mid-career Congressional Science Fellow advising on science and technology; (3) established undergraduate and graduate programs in environmental and engineering geosciences at Radford University; (4) established an Institute for Engineering Geosciences that served both public and corporate environmental needs; and (5) consults on topics of water quality and ground stability for government agencies including the U.S. Geological Survey, U.S. Forest Service, U.S. Army Corps of Engineers, U.S. National Park Service, various state departments of transportation and the Virginia Office of the Attorney General.

Collaborators and Other Affiliations:

- **Recent Collaborators and Co-Editors**

1. Mr. William Bonvillian, Chief Counsel, Office of Senator Joseph Lieberman, U.S. Senate
2. Mr. Charles Ludlam, Counsel, Office of Senator Joseph Lieberman, U.S. Senate

- **Graduate and Postdoctoral Advisors**

1. Dr. Terry R. West, Department of Earth & Atmospheric Sciences, Purdue University
2. Mr. Gordon Prescott, Department of Earth & Atmospheric Sciences, Purdue University
3. Dr. William Lovell, Department of Civil Engineering, Purdue University

- **Thesis Advisor and Postgraduate-Scholar Sponsor.**

1. Robin Reed, masters' thesis adviser, currently employed by Schnabel Engineering Associates, Blacksburg, Virginia.
2. Dustin Reedy, masters' thesis adviser, currently employed by Joyce Engineering, Richmond, Virginia
3. Total number of graduate students advised: 14

Biographical Sketch

ERIK C. WESTMAN
ewestman@vt.edu
(540) 231-7510

Mining and Minerals Eng. Department, Holden Hall
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0435

PROFESSIONAL PREPARATION

Colorado School of Mines	Geophysical Engineering	B.S., 1986
University of Colorado	Civil Engineering	M.S., 1994
Virginia Tech	Mining and Minerals Engineering	Ph.D., 1999

PROFESSIONAL POSITIONS

Assistant Professor, Virginia Tech	1999-present
Research Associate, Virginia Tech	1997-1999
Mining Engineer, NSA Engineering	1996-1997
Geophysical Engineer, U.S. Bureau of Mines	1991-1996

Research Interests: tomographic imaging of stress redistribution in rock masses.

PUBLICATIONS

Most closely related to proposed project:

1. Westman, E.C., 2004, "Use of tomography for inference of stress redistribution in rock," IEEE–IAS Transactions on Industry Applications, Vol. 40, pp.1413-1417.

2. Westman, E.C., F. Shreve, 2003, "Design and testing of multi-channel borehole geophone array," SME Transactions, Vol. 314, Nov 2003, pp. 172-176.

3. Westman, E.C., K. Heasley, P. Swanson, and S. Peterson, 2001 "A correlation between seismic tomography, seismic events, and support pressure," Proceedings of 38th U.S. Rock Mechanics Symposium (Washington, D.C., July 7-10), pp. 319-326.

4. Westman, E.C. and K.Y. Haramy, 1996, "Seismic tomography to map hazards ahead of the longwall face," Mining Engineering, Vol. 48, No. 11, pp. 73-79.

5. Friedel M.J., M.J. Jackson, E.M. Williams, M.S. Olson, and E.C. Westman, 1996, "Tomographic imaging of coal pillar conditions: observations and implications," Int. J. Rock Mech. Min. Sci. & Geomech. Abstr., Vol. 33, No. 3, pp. 279-290.

Other significant publications:

1. Westman, E.C., 2003, "Tomographic imaging of rock failure," The Virginia Tech Scholarly Review, Number 1, March, 2003, pp 26-31.

2. Westman, E.C., C. Haycocks, and M. Karmis, 2000, "Accuracy analysis of GIS-based coal resource estimation," SME Mining Transactions, Vol. 308, pp. 164-167.

3. Reed, W.R.; E.C. Westman, and C. Haycocks, 2000, "Environmental effects of increased blasting density in Appalachian limestone operations." Environmental Issues and Management of Waste in Energy and Mineral Production, (Calgary, Alberta, May 30 – June 2, 2000), Ed. R.K. Singal and A.K. Mehrotra, Rotterdam, Netherlands: A.A. Balkema, pg. 231-235.

4. Westman, E.C., C. Haycocks, and C.E. Zipper, 2000, "Estimation of Southwest Virginia Coal Reserves," Virginia Cooperative Extension Publication 460-139, 8 pp.

5. Westman, E.C., C. Haycocks, and M. Karmis, 1998, "Resources vs. mineable reserves: the future of central Appalachian coal mining," Mining Engineering, Vol. 50, No. 12, pp. 33-37.

Synergistic activities:

- Recruited three members of traditionally underrepresented groups for advanced study, two for graduate school and the other for an NSF-sponsored Research Experience for Undergraduates.
- Faculty advisor for Intercollegiate Mining Competition Team and student chapter of National Stone, Sand, and Gravel Assoc.

Collaborators and Other Affiliations:

Within Virginia Tech: G. Adel; M. Gutierrez; M. Karfakis; G. Luttrell; M. Mauldon; T. Novak, U. Vandsburger.

Outside Virginia Tech: L. Burke, NIOSH-PRL; A. Iannachionne, NIOSH-PRL; W. Johnson, Newmont Gold; M. Mrugala, DOE; W. Reed, NIOSH-PRL; C. Wieczorek, FM Global

Graduate advisor: Prof. Chris Haycocks, Virginia Polytechnic Institute and State University

Thesis and Postdoctoral advisees: L. Burke, NIOSH-PRL; W. Johnson, Newmont Gold; K. Luxbacher, Virginia Tech; K. Min, Virginia Tech; R. Mitra, Virginia Tech; M. Murphy, Virginia Tech; W. Reed, NIOSH-PRL; C. Wieczorek, FM Global

John Sheridan Wilson, Ph. D.

301 Burruss Hall (M/C 0244)
(540) 231-5188 (Office); (540) 231-4384 (fax)
wilsonj@vt.edu

P r o f e s s i o n a l E x p e r i e n c e

Virginia Polytechnic Institute and State University *March 1999 to present*
Blacksburg, VA

Assistant Vice President for Administration, Office of Vice President for Research. *I joined Virginia Tech during the course of the preparation of a proposal for the UT-Battelle bid on Oak Ridge National Lab (ORNL) and serve as the liaison person between Virginia Tech and ORNL. I assumed the additional duties of Assistant Vice Provost in March 2000 (since retitled Asssitant Vice President) in which I manage the fiscal, business and administrative operations for the Vice President for Research.*

Waste Policy Institute
Blacksburg, VA & Morgantown, WV *August 1995 to March 1999*

Executive Vice President and Chief Operating Officer. *I transitioned to this position from my Operations Director position in Morgantown (and moved to Blacksburg in June 1997). I was responsible for the operations and programs of the company which has an annual revenue of ~$25 million per year and a staff of 180 employees. As Chief Operating Officer, I was an officer of the corporation and interacted with the Board of Directors and Virginia Tech administrative and academic officials (WPI is a non-profit company affiliated with Virginia Tech). My initial position with WPI was Operations Director for the Morgantown office that I opened, staffed and managed for WPI in support of the Morgantown Energy Technology Center of the U.S. Department of Energy.*

Rich-Mar Systems Corporation *September 1994 to August 1995*
Alexandria, VA

Vice President, Proposal Management and Support Operations. *I assisted companies in preparing proposals for Government funding of R&D and management support.*

U.S. Department of Energy, Morgantown Energy Technology Center (METC) *April 1968 to September 1994*
Morgantown, WV

Deputy Director. *I served in this Senior Executive Service position in the operation of the Federal research and development and contract management office for the Department of Energy under two METC Directors. I took an early retirement from this position in September 1994 after almost 29 years of service.*

In this role, I was responsible for the operations of the center in the absence of the Director. The Center has a federal staff of about 300, a contractor staff of about 300, and an annual operating budget of $400 million.

I was involved over many years in the preparation and defense of the Fossil Energy budget. Included in these responsibilities was working with Congressional committees, the Office of Management and Budget, and internal DOE organizations to justify and report progress on funded research and development activities.

I have represented the Department of Energy in the negotiation and management of international agreements with Japan and the Peoples Republic of China. I also served as an Executive Committee member for an International Energy Agency program involving the U.S., the U.K., and the Federal Republic of Germany.

I held a number of positions at METC from Project Engineer up through the Deputy Director position.

Education

West Virginia University *1966*
Morgantown, WV
B.S. Chemical Engineering
West Virginia University *1968*
Morgantown, WV
M.S. Nuclear Engineering
West Virginia University *1975*
Morgantown, WV
Ph.D. Chemical Engineering

Professional Organizations

- ***American Society of Mechanical Engineers***
- ***American Chemical Society***
- ***Sigma Xi, Research Honorary***
- ***Tau Beta Pi, Engineering Honorary***

Patent

- ***#4,475,884—Reversed flow fluidized-bed combustion apparatus.***

Awards and Honors

- ***NASA Fellowship, M.S. program***
- ***Special Act Award, 1986 for DOE Clean Coal Program.***
- ***Performance Awards for DOE service***

Publications and Presentations

I have authored and presented numerous technical and management papers related to fossil fuel combustion, gasification and other fossil fuel processing. My Master's thesis related to nuclear radiation measurement in high flux gamma fields. My Ph.D. dissertation developed the application of nuclear isotope tracing of combustion reactions in a furnace.

Albert R. Young
Brief Biography and Representative Publications

November 2002

Personal

Born January 9, 1960, Berkeley, California

Education

Harvard Univeristy	Ph.D., Physics	1990
University of Washington (Seattle)	B.Sc., Physics	1982

Employment

Associate Professor of Physics, NCState University	2001-current
Assistant Professor of Physics, NCState University	2000- 2001
Assistant Professor of Physics, Princeton University	1996-2000
Lecturer, Princeton University	1994-1996
Research Associate, Princeton University	1992-1994
Junior Research Fellow, California Institute of Technology	1990-1992
Teaching Fellow, Harvard University	1986-1987
Research Assistant, Harvard University	1983-1990
Honors Tutor, University of Washington	1979-1980

Academic Honors

Graduated Univ. of Wash. with college and deparmental honors (1982)

Closely Related Publications

Measurements of Ultracold Neutron Lifetimes in Solid Deuterium, C. L. Morris, J. M. Anaya, T. J. Bowles, B. W. Filippone, P. Geltenbort, R. E. Hill, M. Hino, S. Hoedl, G. E. Hogan, T. M. Ito, T. Kawai, K. Kirch, S. K. Lamoreaux, C.-Y. Liu, M. Makela, L. J. Marek, J. W. Martin, R. N. Mortensen, A. Pichlmaier, A. Saunders, S. J. Seestrom, D. Smith, W. Teasdale, A. R. Young, J. Yuan, Phys. Rev. Lett. **89**, 272501 (2002).

Production of UCN by downscattering in superfluid ^{4}He, E. Korobkina, R. Golub, B. W. Wehring, A. R. Young, Physics Letters A **301**, p. 462 (2002).

Ultra-Cold Neutron Upscattering in a Molecular Deuterium Crystal, C.-Y. Liu, A. R. Young and S. K. Lamoreaux, Rapid Communications: Phys. Rev. B **62**, R3581 (2000).

Depolarization of Ultracold Neutrons During Their storage in Material Bottles, A. P. Serebrov, M. Lasakov, A. V. Vassiljev, I. A. Krasnoshekova, Yu. P. Rudnev, A. K. Fomin, V. E. Varlamov, P. Geltenbort, J. Butterworth, A. R. Young, U. Pesavento, Phys. Lett. A **313**, 373 (2003).

Performance of the Prototype LANL Solid Deuterium Ultra-Cold Neutron Source R. E. Hill for the SD_2 collaboration, with G. L. Greene, L. Marek, E. Pasyuk, A. Garcia, B. Fujikawa, S. Baessler, Nucl. Instr. and Meth. **440**, 674 (2000).

Significant Publications

Slow Spin Relaxation of Rb Atoms Confined in Glass Cells with Dense ^{4}He Gas at 1.85 K, A. Hatakeyama, K. Oe, S. Hara, J. Arai, T. Yabuzaki, and A. R. Young, Phys. Rev. Lett. **84**, 1407 (2000).

Polarization of ^{3}He by spin exchange with optically pumped Rb and K vapors, A. Ben-Amar Baranga, S. Appelt, M. V. Romalis, C. J. Erickson, A. R. Young, G. D. Cates and W. Happer, Phys. Rev. Lett. **80**, 2801 (1998).

Three-dimensional Imaging of Spin Polarization of Alkali-metal Vapor in Optical Pumping Cells, A. R. Young, S. Appelt, A. Ben-Amar Baranga, C. Erickson, and W. Happer, App. Phys. Lett. **70**, (1997).

Search for Monoenergetic Positron Emission from Heavy-ion Collisions at Coulomb-barrier Energies, Phys. Rev. Lett **78**, 618 (1997).

Dielectronic Recombination for C^{3+} in a Known External Field D. W. Savin, L. D. Gardner, D. B. Reisenfeld, A. R. Young, and J. L. Kohl, Phys. Rev. A **53**, 280 (1996).

Synergistic Activities: Learn-by-Teaching outreach program at Princeton 1998-2000; invited speaker at the NSAC planning meeting in Oakland, 2001; co-organized NNbar workshop, 2002, LENS program review committee, NSF, 2002.

Collaborations: UCNA collaboration, Majorana collaboration, KamLAND collaboration, APEX collaboration.

Graduate and Post-Doctoral Advisors: Thesis advisor: J. Kohl, Harvard-Smithsonian Center for Astrophysics, Post-Graduate Advisors: F. Boehm, Caltech, F. Calaprice, Princeton, G. Cates, Princeton.

Graduate Students: (4) graduate students: C.-Y. Liu (graduated), S. Hoedl (graduated), Y.-P. Xu, and J. Kephart (current). (3) post-graduate scholars: D. Smith, R. Jain and K. Sabourov.