

Michael E. Campana
Professor, Department of Earth and Planetary Sciences
Director, Water Resources Program
University of New Mexico
Albuquerque, New Mexico 87131 USA
Office: 1 505 277 3269; Fax: 1 505 277 8843; Home: 1 505 281 0689
E-mail: aquadoc@unm.edu URL: <http://epswww.unm.edu/facstaff/aquadoc/home.htm>

EDUCATION

B.S., 1970, College of William and Mary, Williamsburg, Virginia
Major: Geology Thesis: Jointing and foliation in the Petersburg Granite near Richmond, VA
M.S., 1973, University of Arizona, Tucson, Arizona
Major: Hydrology Thesis: Determination of hydraulic parameters in a fractured rock aquifer
Ph.D., 1975, University of Arizona, Tucson, Arizona
Major: Hydrology Minor: Mathematics
Dissertation: Finite-state models of transport phenomena in hydrologic systems

PROFESSIONAL EXPERTISE

Hydrogeologic flow system delineation
Water resources planning and management
Surface water -- ground-water interactions
Hydrogeologic aspects of waste disposal
Education in hydrogeology, hydrology and related earth/environmental sciences
Ground-water hydraulics, resource evaluation and development; Arid zone hydrology
Environmental fluid mechanics

EXPERIENCE

1997-Present. Director, Water Resources Program, University of New Mexico, Albuquerque, NM 87131-1217. Responsible for budgetary, programmatic and curricular aspects of a multi- and interdisciplinary professional program offering a Master's degree in Water Resources. Responsible for implementing a more flexible, two-track curriculum that permits students to specialize in either Hydrosience or Policy/Management. Develop research proposals, obtain over \$1,200,000 in external funding, and perform research related to water resources. Teach water resources and physical hydrology courses and supervise student professional projects (0.50 FTE since August 1997).

1989-Present. Professor, Department of Earth and Planetary Sciences, (Associate Professor from 1989-97), **University of New Mexico, Albuquerque, NM 87131-1116.** Develop teaching and research program in hydrogeology and hydrology. Teach graduate and undergraduate courses, supervise student research. Participate in interdisciplinary research and teaching programs. Developed curricula for undergraduate specialization in hydrogeology and a B.S. in Environmental Science. Obtain \$5,700,000 (\$3,000,000 as PI or co-PI; \$2,700,000 as a significant participant) in sponsored research from U.S. Department of Energy, National Science Foundation, Sandia National Laboratories, U.S. Geological Survey, State of New Mexico, U.S. Geological Survey, and other sources (0.50 FTE since August 1997).

1995-1996. Sabbatical leave. Spent most of Fall 1995 at the Research Institute for Groundwater, National Water Research Center, Arab Republic of Egypt, developing research projects of mutual interest (regional flow in the fissured carbonate and Nubian aquifers, etc.) and providing technical assistance to Egyptian hydrologists and engineers. Spent Spring 1996 at University College of Belize as a Fulbright Scholar teaching Watershed Management, designing courses and curricula in natural resource management and developing research projects.

1984-1989 and 1976-1983. Associate Research Professor (Assistant from 1976-79), **Water Resources Center, Desert Research Institute, 2215 Raggio Parkway, Reno, NV 89512-1095.** Wrote proposals, prepared budgets, obtained funding for and conducted research in hydrology, hydrogeology and related fields. Served as PI/co-PI on 25 projects (over \$4,500,000) sponsored by USGS, DOE, NSF, State of Nevada and private firms. Supervised research by graduate students, technicians and other professionals. Provided water resources and related information to the general public and government agencies. Played significant roles on other projects worth over \$25,000,000.

1984-1989 and 1976-1983. Associate Professor of Hydrogeology (Assistant from 1976-79), **Department of Geological Sciences, Mackay School of Mines, University of Nevada, Reno, NV 89557-0138.** Developed and taught upper-division and graduate courses. Supervised M.S. (22) and Ph.D. (1) thesis research. Developed curriculum for a B.S. in Hydrogeology. Took a leadership role in the interdisciplinary Graduate Program in Hydrologic Sciences; developed a new core curriculum on two different occasions. (Note: this was a concurrent, non-tenure track position with my DRI position; my duties were 80% research at DRI and 20% teaching/advisement at UNR.)

1988-1989. Visiting Associate Professor, Earth Sciences Board, University of California, Santa Cruz, CA 95064. Taught hydrologic fluid dynamics course, part of a ground-water hydrology course and conducted research while on sabbatical leave from the Desert Research Institute.

1983-1984. Associate Professor, Department of Geology, Georgia State University, Atlanta, GA 30303. Taught historical geology courses and developed graduate courses in hydrogeology and related fields.

1974-1975 and 1973-1974. Associate Faculty Member, Pima Community College, Tucson, AZ 85709. Taught physical and historical geology courses, both lectures and laboratories. Advised students on career opportunities in the earth/environmental sciences.

UNM SERVICE

Department of Earth and Planetary Sciences

Colloquium Organizer, 2000

Graduate Committee, 1989-93; 1997 - present

Stable Isotope Geochemist Search Committee, 1996-97

Editor, Departmental Brochure, 1996-97

Undergraduate Committee, 1993-95

Low Temperature Geochemist Search Committee, 1992-93

Silver Professorship Search Committee, 1990-91

Lecture and Colloquium Series Committee, 1990-92

Other

Senior Promotion Committee, College of Arts and Sciences, 1999

J. Rivera Senior Promotion Committee, Anderson Schools of Management/SPA, 1999

Director, Water Resources Program, 1997 - present

Faculty Senate Curricula Committee, 1997 - present; Co-Chair, 1999 - present

Challenge Assistantship Award Committee, Office of Graduate Studies, 1993

Program Committee, Water Resources Program, 1990 - present

Registrar Search Committee, 2000

Internal Reviewer, Geography Department Review, 2000

Co-Chair, Strategic Committee on Graduate and Professional Education, Recruiting and Mentoring

COURSES TAUGHT

(G = graduate; U = undergraduate; U/G = both undergraduate and graduate)

Historical Geology (9 times; U)

Physical Geology (3; U)

Groundwater Hydrology/Hydrogeology (17; U/G)

Groundwater Hydraulics (7; G)

Environmental Mechanics (3; U/G)

Hydrologic Fluid Dynamics (2; U/G)

Physical Hydrology (2)

Groundwater Analysis (4; U/G)

Groundwater Mechanics (3; G)

Geological Fluid Mechanics (2; G)

Subsurface Fluids in Geologic Processes (2; G)

Hydrogeology Laboratory (2; U/G)

Well Hydraulics (1; G)

Numerical Modeling in Subsurface Hydrology (1; G)

Watershed Management (1; U)

Subsurface Fate and Transport Processes (2; U/G)

Interdisciplinary Water Resources I: Basin Survey (4; G)

Interdisciplinary Water Resources II: Technical Models (3; G)

Interdisciplinary Water Resources III: Field-Based Problems (4; G)

STUDENT ADVISEMENT/THESIS SUPERVISION

I have served on over 120 M.S. and Ph.D. committees in water resources administration, biology, hydrology/hydrogeology, geology, geological engineering, civil engineering and range wildlife and forestry. I supervised 2 B.S. theses, 30 M.S. theses, 10 Master's projects, and 1 Ph.D. dissertation. I currently supervise the work of 6 Water Resources (Master's degree) students, 3 E&PS (1 M.S. and 2 Ph.D.) students, and co-advise 1 E&PS Ph.D. student.

CURRENT/RECENT TEACHING AND RESEARCH

Teaching

Since arriving at UNM in 1989 I have designed a graduate curriculum in hydrogeology consisting of graduate and upper-division/graduate courses. I also designed and equipped a hydrogeology laboratory. I supervised 25 special problems/independent studies courses (18 graduate students and 7 undergraduate students), 2 undergraduate Honors theses, 10 Master's projects and 8 M.S. theses. I have been a thesis/dissertation committee member in the Departments of Biology, Civil Engineering, Geography, Anthropology and Community and Regional Planning. I have developed a new hydrogeology option for our B.S. program which allows undergraduates to specialize in hydrogeology. I also developed, along with several E & PS colleagues, a B.S. degree in Environmental Science and will be teaching the introductory and capstone courses in that curriculum. In the past five years I have designed 7 new courses: Environmental Mechanics; Geological Fluid Mechanics; Physical Hydrology; Subsurface Fate and Transport Processes; Freshwater Ecosystems; Environmental Systems; and Advanced Environmental Science. I am also a key participant in the Freshwater Sciences Interdisciplinary Doctoral Program (FSIDP), a 5-year, \$2,700,000 project funded by NSF's IGERT Program that seeks to educate freshwater scientists at UNM and the University of Alabama. I co-designed and will co-teach one of the four FSIDP core courses, Freshwater Ecosystems. I have served on our departmental Graduate Committee for 8 years and on the Undergraduate Committee for 2 years. In March 1997 I became the Director of UNM's Water Resources Program, a joint multi- and interdisciplinary professional program of the College of Arts and Sciences; and the Schools of Engineering; Law; Architecture and Planning; and Management. I recently implemented a new curriculum for the Program that permits students to pursue a technically-based Master's degree in Water Resources

(MWR degree). Enrollments in the MWR degree program have almost doubled (c. 24 to 44) since I became Director.

Research

With support from NSF and EPA, colleagues from the Departments of Economics and Geography and I are developing a coupled hydrologic-economic-water rights model (Water Availability Model or WAM) that will aid water managers in allocating water during drought. Colleagues in the Department of E & PS and Biology and I, along with our counterparts at the University of Alabama, have received an NSF IGERT (Integrative Graduate Education Research Traineeship) grant to fund 18 Ph.D. students over five years, who will study in our joint Freshwater Sciences Interdisciplinary Doctoral Program. Gary Smith of UNM, Sean McKenna of SNL and I have NSF support to study the relationships between sedimentation in asymmetric extensional basins and the hydraulic properties of the basin-fill aquifers. I am also collaborating with researchers from the Desert Research Institute and the University of Nevada-Reno to examine the contributions of irrigation return flow on the hydrology, water quality and aquatic ecology of the Truckee River east of Reno, NV. During a recent trip to Panama I initiated a limited hydrologic investigation, using stable isotopes of water, to delineate sources and mechanisms of runoff in the southern Darien Province. Results will be used to develop a proposal for substantial funding. My colleagues in the Departments of Geography and Economics and I have developed a workshop on "Valuation of Water in the Americas", which will likely be held in Caracas, Venezuela, in November 2000.

FUNDED RESEARCH AND OTHER PROJECTS (since 1990)

Water quality and sustainability in the Sandia Basin, East Mountain Area, central New Mexico. U.S. Department of Commerce-NOAA; \$10,000; 6/23/00-2/16/01.

An integrated GIS framework for water reallocation and decision-making in the Upper Rio Grande Valley. U.S. Environmental Protection Agency (co-PI with O.P. Matthews, D. Brookshire, L. Scuderi); \$410,000; 6/1/00 - 5/31/03.

IGERT: Freshwater graduate studies link fundamental science with applications through integration of ecology, hydrology and geochemistry in regions with contrasting climates. National Science Foundation (PIs: C. Dahm, A. Ward, R. Wetzel, W. Lyons, A. Benke, et al.); \$2,700,000; 6/1/00-5/31/05.

Sustainable water resources development: valuation of water in the Americas. U.S. Department of Commerce-NOAA (co-PI with O.P. Matthews and D. Brookshire); \$20,000; 4/24/00-5/31/01.

A quantitative assessment of the economic and institutional impacts of climate change on the Upper Rio Grande Valley using an integrated GIS framework. National Science Foundation (co-PI with L. Scuderi, O.P. Matthews, D. Brookshire and J. Chermak); \$675,000; 6/1/00-5/31/03

Preliminary assessment of the transient distribution of deuterium and oxygen-18 in the ground water of the Roswell Basin, southeastern New Mexico. UNM Research Allocations Committee; \$7,500; 4/1/00-9/30/00.

Environmental isotopic dynamics in the Roswell Ground-Water Basin, New Mexico, USA. International Atomic Energy Agency (research conducted in concert with IAEA Coordinated Research Programme Isotope response to the dynamic changes in groundwater systems due to long-term exploitation), funding provided for travel only (6/1/99-5/31/02).

Policy conflicts and sustainable water resources development in New Mexico's Rio Grande Basin. U.S. Department of Commerce-NOAA (co-PI with O.P. Matthews); \$15,000; 6/1/99-2/15/00.

A multi-level approach to modeling ground- and surface-water exchange in agriculturally-dominated settings. U.S. Geological Survey and Desert Research Institute (co-PI with A. McKay, Desert Research Institute and J. Warwick, University of Nevada-Reno); \$742,000 (UNM share: \$85,000); 9/1/98-8/31/01.

Sustainable water resources development in New Mexico and the Rio Grande Basin. U.S. Department of Commerce-NOAA (co-PI with O.P. Matthews); \$21,500; 6/1/98-9/30/99.

Outcrop characterization of heterogeneity: explicit linkage of hydrologic and sedimentological properties. National Science Foundation, Hydrologic Sciences Program (co-PI with G.A. Smith), \$120,000 (8/15/97-8/14/00).

Geochemistry and hydrology of the Red River stream system before and after open-pit mining, Questa area, Taos County, NM. Office of Natural Resource Trustee, State of New Mexico (co-PI with B. Allen, R. Anderson, L. Crossey), \$134,000 (6/1/97-9/30/99).

Surface hydrology of Sandia National Laboratories and environs. Sandia National Laboratories, \$130,400 (12/15/93-5/31/96).

Subsurface flow and transport research assistant support. Sandia National Laboratories, \$58,000 (10/1/95-9/30/97).

Stream/ground water ecotones: hydrology, biogeochemistry and ecology. National Science Foundation, Ecosystems Studies Program (co-PI with C.N. Dahm), \$740,000 (2/1/95-7/31/99).

Lecturing in hydrology and earth science at University College of Belize. Fulbright Scholar program, \$19,600 (1/1/96-5/31/96).

Compartmental-model simulation of groundwater flow systems. International Atomic Energy Agency (research conducted in concert with IAEA Coordinated Research Programme Use of isotopes for analyses of flow and transport dynamics of groundwater systems), funding provided for travel only (6/15/96-6/15/99).

Experimental flooding at Bosque del Apache National Wildlife Refuge, Rio Grande, New Mexico. National Science Foundation co-PI with H.M. Valett, M.C. Molles, C.S. Crawford, \$45,000 (7/1/94-9/30/96).

Yucca Mountain Project. Sandia National Laboratories- U.S. Department of Energy, \$205,000 (10/1/92 - 9/30/95).

Development of integrated water budget models. U.S. Fish and Wildlife Service (co-PI with T. Moore, B. Thomson, R. Heggen), \$34,100 (5/15/91-9/30/92).

Stream hyporheic zones: hydrology, biogeochemistry, and links to surface waters and plant riparian communities. National Science Foundation (co-PI with C.N. Dahm), \$640,000 (3/1/91-2/28/94).

Evaluation of unsaturated zone contaminant transport models for waste management, Phases I and II. Waste Management Education and Research Consortium and U.S. Department of Energy (co-PI with T. Sammis, New Mexico State University), \$101,000 (2/10/91-2/28/93).

PROFESSIONAL ACTIVITIES (since 1990)

Member, National Research Council Committee on USGS Water Resources Research, 1999-2001.

Member, National Research Council Committee on Opportunities to Improve the National Water Quality Assessment (NAWQA) Program, 1999-2001.

Secretary-Treasurer, Association of Ground-Water Scientists and Engineers, (AGWSE) 2000-2001.

Board of Directors, Association of Ground-Water Scientists and Engineers, (AGWSE) 1997-2001.

Board of Directors, Universities Council on Water Resources (UCOWR), 2000-2003.

Vice President of Academic Affairs, American Institute of Hydrology (AIH), 2001-2002.

Book Editor, *Ground Water*, 1999 – present.

Associate Editor, *Ground Water*, 1999 – present.

Fulbright Program Review Committee, Canada - Mexico - Latin America – Caribbean, 1999-2001.

Technical Program Chair, Geological Society of America Rocky Mountain – South-Central Sections Joint Meeting, Albuquerque, NM, April 2001.

Chair, AGWSE Annual Meeting, Las Vegas, NV, December 2000.

Co-Chair, AGWSE Annual Meeting, Nashville, TN, December 1999.

Guest Co-Editor, E.S. Simpson Memorial Issue, *Hydrogeology Journal*, 6(1), 1998.

External Reviewer, Water Resources Management Program, UNLV, 1998.

Member, National Water Initiative Steering Committee, 1997 - present.

Reviewer, *Hydrogeology in Practice* textbook, Prentice Hall, 1998.

UNM Delegate, Commission on Food, Energy and Renewable Resources, National Association of State Universities and Land-Grant Colleges, 1998 - present.

Lead UNM Delegate, Universities Council on Water Resources, 1997-present.

Co-Chair, First and Second Assemblies for Water Planning in the Middle Rio Grande Valley, 1997.

Member, Publishing Oversight Committee, National Ground Water Assn., (publishes *Ground Water*, *Ground Water Monitoring and Remediation*, and *Water Well Journal*), 1997-present.

Member, Program Development and Review Board, New Mexico Water Resources Research Institute, 1997-present.

Co-Chair, AGWSE Annual Meeting, Las Vegas, NV, September 1997.

Instructor, five-day short course on General Geology and Hydrology of the Eastern Jemez Mountains and Vicinity, Waste-management Education and Research Consortium (WERC) Program, June 1997.

Reviewer, *A Mathematical Primer on Groundwater Flow* textbook, Prentice Hall, 1997.

Reviewer, *Physical Hydrologic Science* textbook proposal, McGraw-Hill, Co., 1996.

Associate Editor, *Environmental and Engineering Geoscience*, 1995-present.

Consultant, Westinghouse Electric Corporation/IT Corporation - Waste Isolation Pilot Plant Project, Carlsbad, NM, 1994.

Instructor, Groundwater Hydrology and Geochemistry short course, UNM School of Engineering, November 1993.

Member, Ground Water Ecology Strategic Workgroup, U.S. Environmental Protection Agency, 1992-1994.

Member, Technical Committee, Second International Conference on Ground Water Ecology, Atlanta, GA, March 1994.

Chair, Rocky Mountain Ground Water Conference, Albuquerque, NM, October 1993.

Consultant, Cibola National Forest, 1993. Provided expertise on riparian habitat restoration in the Zuni Mountains, NM.

Member, U.S. National Committee, International Assn. of Hydrogeologists, 1991-1995.

Reviewer, *Ground Water, Hydrogeology Journal, Water Resources Research, Journal of Volcanology and Geothermal Research, Journal of Hydrology, Hydrological Processes, Environmental and Engineering Geoscience, Journal of Hydraulic Engineering, Journal of the North American Benthological Society, Journal of the American Water Resources Association, and Limnology and Oceanography.*

Proposal reviewer, National Science Foundation; National Science and Engineering Research Council of Canada; U.S. - Israel Binational Science Foundation; Los Alamos National Laboratory; New Mexico Water Resources Research Institute.

Member, VITA (Volunteers in Technical Assistance), 1984-present.

Member, ACDI/VOCA (Agriculture Cooperative Development International/Volunteers in Overseas Cooperative Assistance), 1995-present.

Member, Lifewater International, 1998-present.

PROFESSIONAL SOCIETY PRESENTATIONS (since 1992)

Karst 2000, Marmaris, Turkey, 2000.

Association of Ground-Water Scientists and Engineers (2), Nashville, TN, 1999

Third Inter-American Dialogue on Water Management, Panama City, Panama, 1999

European Geophysical Society XXIII General Assembly, Nice, France, 1998

Seventh International Symposium on Water Tracing, Portoroz, Slovenia, 1997

INTECOL V Wetlands Conference, Perth, Australia, 1996 (invited)

International Symposium on Karst Water Resources, Antalya, Turkey, 1995

Pacific Science Congress, Beijing, China, 1995

Geological Society of America Annual Meeting, Seattle, WA, 1994

Second International Conference on Ground Water Ecology, Atlanta, GA, 1994

American Geophysical Union Fall Meeting, San Francisco, CA, 1993

Sixth International Symposium on Water Tracing, Karlsruhe, Germany, 1992
First International Conference on Ground Water Ecology, Tampa, FL, 1992
New Mexico Section, American Water Reso. Assn. Annual Mtg., Socorro, NM, 1992

INVITED LECTURES (since 1992)

Colby College Geology Department Seminar, 1998
New Mexico Riparian Council Annual Meeting, 1998
Hydrologic Sciences Program Seminar, University of Nevada-Reno, 1997
Workshop on Isotope Hydrology, International Atomic Energy Agency, Paris, 1996
CSIRO Workshop on Surface Water-Ground Water Interactions, Perth, Australia, 1996
Research Inst. for Groundwater, Nat'l. Water Res. Ctr., Arab Rep. of Egypt, 1995
Ministry of Public Works and Water Reso. short course, Arab Rep. Of Egypt, 1995
Inst. de Geofisica, Universidad Nacional Autonoma de Mexico, Mexico, D.F., 1994
Department of Environmental Sciences, Policy and Management, UC-Berkeley, 1994
Earth and Environmental Sciences Division, Los Alamos National Laboratory, 1994
Hydrology Program Seminar, New Mexico Tech, 1993
Water Resources Program, University of Nevada-Las Vegas, 1992
National Science Teachers' Assn. Western Area Convention, 1992

PROFESSIONAL ORGANIZATIONS

American Geophysical Union
American Institute of Hydrology
American Water Resources Association
European Geophysical Society
Geological Society of America
National Ground Water Assn. - Assn. of Ground-Water Scientists and Engineers
International Association of Hydrogeologists
International Association of Hydrological Sciences
International Water Resources Association
British Geomorphological Research Group

PROFESSIONAL CERTIFICATION

Certified Professional Geologist, State of Indiana (#430)
Professional Hydrogeologist, American Institute of Hydrology (#175)

AWARDS AND HONORS

Gallagher Visiting Scientist, University of Calgary, 2001
Fulbright Scholar (Belize), 1995-96 academic year
Who's Who in the West (24th edition)
Who's Who in Science and Engineering (5th edition)
American Men and Women of Science

PUBLICATIONS

Refereed

Matthews, O.P., L. Scuderi, D. Brookshire, K. Gregory, S. Snell, K. Krause, J. Chermak, B. Cullen and M. Campana, in press. Marketing Western water: can a process based geographic information system improve reallocation decisions? *Natural Resources Journal*.

Campana, M.E., G.A. Harrington and L. Tezcan., in press. Compartmental model approaches to groundwater flow simulation. In W. Mook (ed.), *Environmental Isotopes in the Hydrological Cycle: Principles and Applications*, v. VI, ch. 3, p. 37-73, UNESCO/IAEA.

Campana, M.E., in press. Compartment model simulation of ground-water flow systems. In Y. Yurtsever (ed.), International Atomic Energy Agency Technical Document TECDOC.

National Research Council, Committee on U.S. Geological Survey Research, 2000. Investigating groundwater systems on regional and national scales. National Academy Press, Washington, DC, 143p.

Morrice, J.A., C.N. Dahm, H.M. Valett, P.V. Unnikrishna, and M.E. Campana, 2000. Terminal electron accepting processes in the alluvial sediments of a headwater stream. *Journal of the North American Benthological Society* 19(4): 593-608.

National Research Council, Committee on U.S. Geological Survey Research, 1999. Hydrologic hazards science at the U.S. Geological Survey. National Academy Press, Washington, DC, 79p.

Wroblicky, G.J., M.E. Campana, H.M. Valett and C.N. Dahm, 1998. Seasonal variation in surface-subsurface water exchange and lateral hyporheic area of two stream-aquifer systems. *Water Resources Research* 34(3):317-328.

Morrice, J.A., H.M. Valett, C.N. Dahm and M.E. Campana, 1997. Alluvial characteristics, groundwater-surface water exchange and hydrologic retention in headwater streams. *Hydrological Processes* 11(3):253-267.

Campana, M.E., W.R. Sadler, N.L. Ingraham and R.L. Jacobson, 1997. A deuterium-calibrated compartment model of transient flow in a regional aquifer system. In A. Kranjc (ed.), *Tracer Hydrology 97*, A.A. Balkema, pp. 389-496.

Amin, I.E. and M.E. Campana, 1997. Analysis of test pumping data under conditions of variable viscosity recharge. In John Chilton et al. (eds.), *Groundwater in the Urban Environment*, v. 1, Problems, Processes and Management, A.A. Balkema, pp. 81-84.

Valett, H.M., C.N. Dahm, M.E. Campana, J.A. Morrice, M.A. Baker and C.S. Fellows, 1997. Hydrologic influences on groundwater-surface water ecotones: heterogeneity in nutrient composition and retention. *J. North American Benthological Society* 16(1):239-247.

Campana, M.E. and J.G. Roth, 1997. Delineation of a carbonate-alluvial groundwater flow system using a mixing-cell model and the spatial distribution of deuterium. In G. Gunay and A.I. Johnson (eds.), *Karst Waters and Environmental Impacts*, A.A. Balkema, pp. 311-318.

Campana, M.E. and R.M. Byer, Jr., 1996. A conceptual evaluation of regional ground-water flow, southern Nevada-California, USA. *Environmental and Engineering Geoscience* II(4):465-478.

Amin, I. E. and M.E. Campana, 1996. A general lumped parameter model for the interpretation of tracer data and transit time calculation in hydrologic systems. *Journal of Hydrology* 179:1-21.

Valett, H.M., J.A. Morrice, C.N. Dahm and M.E. Campana, 1996. Parent lithology, groundwater-surface water exchange and nitrate retention in headwater streams. *Limnology and Oceanography* 41(2): 333-345.

Wroblicky, G.J., M.E. Campana, C.N. Dahm, H.M. Valett, J.A. Morrice, K.S. Henry, and M.A. Baker, 1994. Simulation of stream-groundwater exchange and near-stream flow paths of two first order mountain streams using MODFLOW. Proceedings, Second International Conference on Ground Water Ecology. Bethesda, MD, Amer. Water Res. Assn., pp. 187-196.

Baker, M.A., C.N. Dahm, H.M. Valett, J.A. Morrice, K.S. Henry, M.E. Campana and G.J. Wroblicky, 1994. Spatial and temporal variations in methane distribution at the ground water/surface water interface in headwater catchments. Proceedings, Second International Conference on Ground Water Ecology. Bethesda, MD, Amer. Water Res. Assn., pp. 29-37.

Henry, K.S., H.M. Valett, J.A. Morrice, C.N. Dahm, G.J. Wroblicky, M.A. Santistevan, and M.E. Campana, 1994. Ground water-surface water exchange in two headwater streams. Proceedings, Second International Conference on Ground Water Ecology. Bethesda, MD, Amer. Water Res. Assn., pp. 319-328.

Amin, I.E. and M.E. Campana, 1992. A general mathematical model for tracer data analysis. In H. Hotzl and A. Werner (eds.), Tracer Hydrology, A.A. Balkema, pp. 453-456.

Wroblicky, G.J., M.E. Campana, H.M. Valett, J.A. Morrice, K.S. Henry, C.N. Dahm, J.V. Hurley and J.M. Noe, 1992. Remote monitoring of stream hyporheic zones with inexpensive pressure transducer-data acquisition systems. Proceedings, First International Conference on Ground Water Ecology. Bethesda, MD, Amer. Water Res. Assn., pp. 267-277.

Kirk, S.T. and M.E. Campana, 1990. A deuterium-calibrated groundwater flow model of a regional carbonate-alluvial system. *Journal of Hydrology*, 119:357-388.

Committee to Review the U.S. Geological Survey National Water Quality Assessment Pilot Program, 1990. A review of the U.S.G.S. National Water Quality Assessment Pilot Program. National Academy Press, Washington, DC, 153p.

Karst, G.B., M.E. Campana and R.L. Jacobson, 1988. A mixing-cell model of the hydrothermal flow system, northern Dixie Valley, Nevada. *Transactions, Geothermal Resources Council*, 12:167-174.

Campana, M.E., 1987. Generation of ground-water age distributions. *Ground Water* 25(1):51-58.

Campana, M.E. and R.L. Boone, 1986. Hydrologic monitoring of subsurface flow and groundwater recharge in a mountain watershed. Proceedings, Cold Regions Hydrology Symposium. Bethesda, MD, American Water Resources Association, pp. 263-273.

Campana, M.E. and D.A. Mahin, 1985. Model-derived estimates of groundwater mean ages, recharge rates, effective porosities and storage in a limestone aquifer. *Journal of Hydrology* 76:247-264.

Campana, M.E. and E.S. Simpson, 1984. Groundwater residence times and recharge rates using a discrete-state compartment model and C-14 data. *Journal of Hydrology*, 72:171-185.

Campana, M.E., 1976. Application of carbon-14 ground-water ages in calibrating a flow model of the Tucson Basin aquifer, Arizona. *Hydrology and Water Resources in Arizona and the Southwest*, 6:197-202.

Research Reports

Campana, M.E., O.P. Matthews, R. DeSimone and D. DeSimone (eds.), 2000. Policy conflicts and sustainable water resources development in New Mexico's Rio Grande Basin. Water Resources Program, University of New Mexico, Pub. No. WRP-2.

Matthews, O.P., M.E. Campana, D. DeSimone, R. DeSimone and N. Gillard (eds.), 1999. Case studies of sustainable water resources development, Rio Grande Basin, New Mexico. Water Resources Program, University of New Mexico, Pub. No. WRP-1.

Campana, M.E. and S.L. Carpenter, 1993. Development and evaluation of an unsaturated zone mixing-cell transport model for waste management. Technical completion report, Waste-Management Education and Research Consortium, New Mexico State University, Las Cruces, NM, 50p. plus 4 appendices.

Note: unless otherwise indicated, all the following are publications of the Water Resources Center, Desert Research Institute, 2215 Raggio Parkway, Reno, NV 89512-1095.

Pottorff, E.J. and M.E. Campana, 1992. A new approach for simulating heat transfer and ground-water flow and its application to the Leach Hot Springs hydrothermal system, Pershing County, Nevada. Publication No. 41121, 139p.

Sadler, W.R., M.E. Campana, R.L. Jacobson and N.L. Ingraham, 1992. A deuterium-calibrated, discrete-state compartment model of regional groundwater flow, Nevada Test Site and vicinity. Publication No. 45088, 77p.

Amin, I.E. and M.E. Campana, 1990. A general mathematical model for the interpretation of tracer data and transit time calculation in hydrologic systems. Publication No. 41122, 60p.

Roth, J.G. and M.E. Campana, 1989. A mixing-cell model of the Railroad Valley regional groundwater flow system, central Nevada. Publication No. 41123, 175p.

Kirk, S.T. and M.E. Campana, 1988. Simulation of groundwater flow in a regional carbonate alluvial system with sparse data: the White River flow system, southeastern Nevada. Publication No. 41115, 76p.

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STUDENT RESEARCH SUPERVISION

(UNM = University of New Mexico; UNR = University of Nevada-Reno)

Ph.D. Dissertations (1)

Isam E. Amin, 1987

A general mathematical model for the interpretation of tracer data and calculation of transit times in hydrologic systems (UNR)

Master's Professional Projects (10)

Tobin K. Walters, 2000

PCB Remediation alternatives on the St. Lawrence River near Massena, New York: quantitative impacts on the industry, the Mohawk Indian Nation, and the U.S. Environmental Protection Agency (UNM – Master of Water Resources)

Casey W. Cook, 2000

A mixing cell groundwater model of the Fernley, Nevada area. (UNM – Master of Water Resources).

William S. McDonald, 2000

Urbanization of Seven Springs, New Mexico: an evaluation of current and projected impacts on ground- and surface-water resources (UNM - Master of Water Resources Administration)

Linda I. Gordan, 2000

Water supply sustainability through water banking (UNM - Master of Water Resources)

Christopher T. McLean, 2000

Estimates of radionuclide loading to Cochiti Lake from Los Alamos Canyon using manual and automated sampling (UNM - Master of Water Resources)

Jeffrey L. Peterson, 1999

Coordinated water resource planning for the Sandia Basin: a perspective on regional planning needs (UNM - Master of Water Resources Administration)

Elaine S. Brouillard, 1999

Erosion potential of the main branch of the Piedras Marcadas watershed, Petroglyph National Monument, New Mexico (UNM - Master of Water Resources Administration)

Marquis B. Childs, 1999

Soil radionuclide concentrations and preliminary stormwater model assessment at Material Disposal Area G, Los Alamos National Laboratory (UNM - Master of Water Resources Administration)

April M. Fitzner, 1998

Physical and legal aspects of river rehabilitation, Middle Rio Grande, New Mexico (UNM - Master of Water Resources Administration)

A. Kyle Harwood, 1995

The urban stormwater contribution of dissolved trace metals from the North Floodway Channel, Albuquerque, NM, to the Rio Grande (UNM - Master of Water Resources Administration)

M.S. Theses (30)

Jerry K. Bird, 1998

Evaluation of aquifer recharge using a mass-balance model and conservative tracers, Sandia National Laboratories/Kirtland Air Force Base, Albuquerque, New Mexico (UNM)

Sharman L. Carpenter, 1997

Numerical simulation of density-dependent contaminant transport in ground water near Lake Karachai, Russia (UNM)

Robert N. Gray, 1997

Hydrologic budget analysis and numerical simulations of groundwater flow in Los Alamos Canyon near Los Alamos, New Mexico (UNM)

James R. Brainard, 1997

Vadose zone flow processes in heterogeneous alluvial fan deposits: experimental design, data evaluation and error analysis (UNM)

Leslie A. Hohweiler, 1996

A method for predicting land subsidence as a result of groundwater withdrawal, Albuquerque, New Mexico (UNM)

John L. Appel, 1995

Hydrogeologic framework of the High Creek calcareous fen, South Park, Park County, Colorado (UNM)

Gregory J. Wroblicky, 1995

Numerical modeling of stream-groundwater interactions, near-stream flowpaths and hyporheic zone hydrodynamics of two first-order mountain stream-aquifer systems (UNM)

Armand R. Groffman, 1994

The characterization of groundwater chemistry and colloids downgradient from uranium mill tailings at Slick Rock and Rifle, Colorado (UNM)

Robert M. Byer, 1991

A carbon-14 calibrated discrete-state compartment model of the groundwater flow system, Yucca Mountain and vicinity, Nevada-California (UNR)

William R. Sadler, 1990

A deuterium-calibrated, discrete-state compartment model of regional groundwater flow, Nevada Test Site and vicinity (UNR)

Kenneth R. Churan, 1989

A transient input discrete-state compartment model of groundwater flow in the Ojo Alamo Sandstone, San Juan Basin, New Mexico (UNR)

Edward J. Pottorff, 1988

A new approach for simulating heat transfer and groundwater flow in the Leach Hot Springs hydrothermal system, Pershing County, Nevada (UNR)

James G. Roth, 1988

Delineation of the Railroad Valley flow system using a deuterium calibrated-groundwater model (UNR)

Amy K. Hadiaris, 1988

Quantitative analysis of groundwater flow in Spanish Springs Valley, Washoe County, Nevada (UNR)

- Susan J. Erikson, 1988
Thermometry as a tool for determining the hydrologic properties of the vadose zone (UNR)
- Thomas A. Feeney, 1987
A deuterium-calibrated groundwater flow model of the western Nevada Test Site and vicinity (UNR)
- Stephen T. Kirk, 1987
Analysis of the White River groundwater flow system using a deuterium-calibrated discrete-state compartment model (UNR)
- Gary B. Karst, 1987
Analysis of the northern Dixie Valley groundwater flow system using a discrete-state compartment model (UNR)
- William Linderfelt, 1987
Numerical analysis of infiltration and near-surface percolation in relation to Yucca Mountain, Nevada (UNR)
- David H. Emme, 1986
Delineation of subsurface flow in the Upper Meadow Valley Wash area, southeastern Nevada (UNR)
- Anthony D. Truschel, 1983
A reservoir-routing model calibration method relating storage elements to basin geomorphology for peak runoff prediction from extreme summer storm events in unglaciated arid watersheds (UNR)
- Richard L. Boone, 1983
Groundwater recharge and subsurface flow processes on a hillslope in the Clear Creek watershed, eastern Sierra Nevada (UNR)
- Neil L. Ingraham, 1982
Environmental isotope hydrology of the Dixie Valley geothermal system, Dixie Valley, Nevada (UNR)
- James E. Szecsody, 1982
Use of major ion chemistry and environmental isotopes to delineate subsurface flow in Eagle Valley, Nevada, (UNR)
- John E. Dowden, 1981
Numerical simulation of artificial recharge in Cold Spring Valley, Nevada (UNR)
- Donald E. Price, 1981
Hydrogeologic study of groundwater-surface water interactions at Topaz Lake, NV (UNR)
- Salem S. Arghin, 1980
Hydrogeology of the Al-Marj Basin, Libya (UNR)
- Robert C. Broadbent, 1980
Numerical modeling of the effects of artificial recharge in the Las Vegas Valley, Nevada (UNR)
- Ahmidi A. Alkaseh, 1979
Hydrogeological and hydrogeochemical aspects of the Jalo area, Libya (UNR)

Donald A. Mahin, 1978

Analysis of groundwater flow in the Edwards limestone aquifer, San Antonio area, Texas (UNR)

B.S. Theses (2)

Kristine Baker-Smith, 1997

Compartment modeling of groundwater residence times and stream-aquifer interactions (UNM)

Mark A. Burkhard, 1991

A modified submerged pressure outflow cell for the determination of soil moisture retention characteristics (UNM)

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