

## CURRICULUM VITAE

### **Barbara Bekins**

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#### EDUCATION:

University of California, Santa Cruz, Ph.D., 1993, Hydrogeology  
San Jose State University, M.S., 1988, Mathematics  
University of California, Los Angeles, B.A., 1975, Mathematics

#### PROFESSIONAL EXPERIENCE:

1990-present: Hydrologist, U.S. Geological Survey, Water Resources Mission Area  
Specialty is integrating field and laboratory observations using computer models. Research interests focus on microbial degradation of contaminants in groundwater and the effect of pore fluids on plate boundary faults.

2006-2008 Instructor, Stanford University, Solute Transport in Groundwater

1988-1993: Researcher and Instructor, University of California, Santa Cruz.

1979-1987: Computer Specialist, U. S. Geological Survey, Seismology Branch.

1977-1978: Research Assistant, Stanford University Geophysics Department.

1976-1977: Mathematics Lab Director, Canada Community College.

1975-1976: Scientific Programmer, SRI International.

#### AWARDS AND HONORS:

Elected U.S. National Academy of Engineering, 2020  
Elected AGU Fellow, 2019  
Elected GSA Fellow, 2005  
GSA Hydrogeology Division Birdsall-Dreiss Lecturer, 2003-2004  
U.S. Geological Survey Meritorious Service Award, 2004  
JOI/USSAC Distinguished Lecturer, 2002-2003  
ARCS Foundation Fellowship, 1989-1990  
University of California Regents' Fellowship, 1988-1989  
B.A. *Summa Cum Laude*, Phi Beta Kappa

#### OCEAN DRILLING PROGRAM PARTICIPATION:

Physical Properties and Downhole Tools, Exp 366, Marianas 12/16-2/17  
Science Planning Committee, 2004-2007.  
Physical Properties Specialist, Leg 201, Peru Deep Biosphere, 1/02-4/02.  
U.S. Science Advisory Committee, 2000-2003.  
Science Steering and Evaluation Panel, Earth's Environment, 1997-2000.  
Hydrologist, Leg 171A, Logging While Drilling, 12/96-1/97.  
Sedimentary and Geochemical Processes Panel, 1994-1996.

## COMMITTEES:

GSA Birdsall-Dreiss Lecturer Selection Committee 2022-  
GSA Meinzer Award Committee, 2017-2019  
AGU Program Committee, 2013-2016.  
AGU Groundwater Technical Committee, Chair 2009-2010  
National Research Council Panel on Intrinsic Remediation, 1997-2000.  
Editorial Search Committee, Water Resources Research, 2000.

## JOURNAL EDITORIAL BOARDS

*Groundwater Monitoring and Remediation*, 2021-present.  
*Geofluids*, 2007-2017.  
*Ground Water*, 1998-2003.  
*Hydrogeology Journal*, 1997-2000.  
*Geology*, 1995-1998.

## PUBLICATIONS

### ***On subsurface microbial processes***

- Beaver, C. L., E.A. Atekwana, B.A. Bekins, D. Ntarlagiannis, L.D. Slater, and S. Rossbach (2021), Methanogens and Their Syntrophic Partners Dominate Zones of Enhanced Magnetic Susceptibility at a Petroleum Contaminated Site, *Frontiers in Earth Science*, 9, doi:10.3389/feart.2021.598172.
- Podgorski, D.C., P. Zito, A.M. Kellerman, B.A. Bekins, I.M. Cozzarelli, D.F. Smith, X. Cao, K. Schmidt-Rohr, S. Wagner, A. Stubbins, R.G.M. Spencer, Hydrocarbons to carboxyl-rich alicyclic molecules: A continuum model to describe biodegradation of petroleum-derived dissolved organic matter in contaminated groundwater plumes, *Journal of Hazardous Materials*, 402 (2021) 123998, doi:10.1016/j.jhazmat.2020.123998.
- Bekins, B.A., J.C. Brennan, D.E. Tillitt, I.M. Cozzarelli, J.M. Illig, D. Martinović-Weigelt, Biological Effects of Hydrocarbon Degradation Intermediates: Is the Total Petroleum Hydrocarbon Analytical Method Adequate for Risk Assessment?, *Environmental Science & Technology*, 54 (2020) 11396-11404, doi:10.1021/acs.est.0c02220.
- Terry, N., F.D. Day-Lewis, J.W.L. Jr., J.J. Trost, and B.A. Bekins. 2019. Geophysical mapping of plume discharge to surface water at a crude oil spill site: Inversion versus machine learning. *Geophysics* 84 no. 5: EN67-EN80, doi:10.1190/geo2018-0690.1.
- Zito, P., R. Ghannam, B.A. Bekins, and D.C. Podgorski, 2019, Examining the Extraction Efficiency of Petroleum-Derived Dissolved Organic Matter in Contaminated Groundwater Plumes. *Groundwater Monitoring & Remediation* 39 no. 4: 25-31, doi:10.1111/gwmr.12349.
- Bekins, B.A., 2018, *Case Studies in Groundwater Contaminant Fate and Transport*, Oxford Bibliographies, doi:10.1093/obo/9780199363445-0096

- Warren, E. and B.A. Bekins, 2018. Relative contributions of microbial and infrastructure heat at a crude oil-contaminated site. *Journal of Contaminant Hydrology*, 211:94-103. doi:10.1016/j.jconhyd.2018.03.011
- McGuire, J.T., I.M. Cozzarelli, B.A. Bekins, H. Link, and D. Martinovic-Weigelt, 2018. Toxicity assessment of groundwater contaminated by petroleum hydrocarbons at a well-characterized, aged, crude oil release site. *Environmental Science & Technology*, doi:10.1021/acs.est.8b03657.
- Podgorski, D.C., P. Zito, J.T. McGuire, D. Martinovic-Weigelt, I.M. Cozzarelli, B.A. Bekins, and R.G.M. Spencer, 2018. Examining Natural Attenuation and Acute Toxicity of Petroleum-Derived Dissolved Organic Matter with Optical Spectroscopy. *Environmental Science & Technology*, 52(11), 6157-6166, doi:10.1021/acs.est.8b00016.
- Baedecker, M.J., R.P. Eganhouse, H. Qi, I.M. Cozzarelli, J.J. Trost, and B.A. Bekins, 2018, Weathering of Oil in a Surficial Aquifer. *Groundwater*, 56(5):797-809 doi:10.1111/gwat.12619.
- Bekins, B.A., Cozzarelli, I.M., Erickson, M.L., Steenson, R.A. and Thorn, K.A., 2016, Crude Oil Metabolites in Groundwater at Two Spill Sites. *Groundwater* 54:5, 681-691, doi:10.1111/gwat.12419.
- Warren, E. and Bekins, B.A., 2015, Relating subsurface temperature changes to microbial activity at a crude oil-contaminated site. *Journal of Contaminant Hydrology* 182, 183-193.
- Hassane, A.B., C. Leduc, G. Favreau, B.A. Bekins, T. Margueron, 2016, Impacts of a large Sahelian city on groundwater hydrodynamics and quality: Example of Niamey (Niger), *Hydrogeol. J.*, 24:407-423, doi 10.1007/s10040-015-1345-z.
- Essaid, H.I., B.A. Bekins, I.M. Cozzarelli, 2015, Organic contaminant transport and fate in the subsurface: Evolution of knowledge and understanding, *Water Resources Research*, *Water Resour. Res.*, 51: 4861-4902, doi:10.1002/2015WR017121.
- Ng, G.-H.C., B.A. Bekins, I.M. Cozzarelli, M.J. Baedecker, P.C. Bennett, R.T. Amos, and W.N. Herkelrath, 2015, Reactive transport modeling of geochemical controls on secondary water quality impacts at a crude oil spill site near Bemidji, MN, *Water Resour. Res.*, 51:4156–4183, doi:10.1002/2015WR016964.
- Warren, E., N. Sihota, F.D. Hostettler, B. A. Bekins, 2014, Comparison of Surficial CO<sub>2</sub> Efflux to other Measures of Subsurface Crude Oil Degradation, *Journal of Contaminant Hydrology*, 164:275–284, doi:10.1016/j.jconhyd.2014.06.006.
- Ng, G.-H. C., B. A. Bekins, I. M. Cozzarelli, M. J. Baedecker, P. C. Bennett, and R. T. Amos, 2014, A Mass Balance Approach to Investigating Geochemical Controls on Secondary Water Quality Impacts at a Crude Oil Spill Site near Bemidji, MN, *Journal of Contaminant Hydrology*, 164:1-15, doi:10.1016/j.jconhyd.2014.04.006.
- Green, C. T., B. A. Bekins, S. J. Kalkhoff, R. M. Hirsch, L. Liao, and K. K. Barnes, 2014, Decadal surface water quality trends under variable climate, land use, and hydrogeochemical setting in Iowa, USA, *Water Resour. Res.*, 50:, 2425-2443, doi:10.1002/2013WR014829.

- Hostettler, F. D. , T. D. Lorenson, and B. A. Bekins, 2013, Petroleum fingerprinting with organic markers, *Environmental Forensics*, 14:262-277, doi:10.1080/15275922.2013.843611
- Rasa, E., B. A. Bekins, D. M. Mackay, N. R. de Siewes, J. T. Wilson, K. P. Feris, I. A. Wood, K. M. Scow, 2013, Impacts of an ethanol-blended fuel release on groundwater and fate of produced methane: Simulation of field observations, *Water Resources Research*, 8:4907-4926, doi:10.1002/wrcr.20382.
- Amos, R. T., B. A. Bekins, I. M. Cozzarelli, M. A. Voytek, J. D. Kirshtein, E. J. P. Jones and D. W. Blowes, 2012, Evidence for iron-mediated anaerobic methane oxidation in a crude oil-contaminated aquifer, *Geobiology*, 6:506-517, doi: 10.1111/j.1472-4669.2012.00341.x
- Liao, L., C.T. Green, B.A. Bekins and J.K. Böhlke, 2012, Factors controlling nitrate fluxes in groundwater in agricultural areas, *Water Resources Research*, v. 48, doi:10.1029/2011WR011008.
- Rasa, E, S.W. Chapman, SW, B.A. Bekins, G.E. Fogg, K.M. Scow, and D.M. Mackay, 2011, Role of back diffusion and biodegradation reactions in sustaining an MTBE/TBA plume in alluvial media, *Journal of Contaminant Hydrology*, v. 126:3-4 , pp. 235-247, doi:10.1016/j.jconhyd.2011.08.006.
- Baedecker, M.J., R. P. Eganhouse, B.A. Bekins, and G.N. Delin, 2011, Loss of Volatile Hydrocarbons from an LNAPL Oil Source, *Journal of Contaminant Hydrology*, doi: 10.1016/j.jconhyd.2011.06.006.
- Amos, R. T., B.A. Bekins, G. N. Delin, I. M. Cozzarelli, D. W. Blowes, and J. D. Kirshtein, 2011, Methane oxidation in a crude oil contaminated aquifer: Delineation of aerobic reactions at the plume fringes, *Journal of Contaminant Hydrology*, doi:10.1016/j.jconhyd.2011.04.003.
- Essaid, H.I., B.A. Bekins, W.N. Herkelrath, and G.N. Delin, 2011, Crude Oil at the Bemidji Site: 25 Years of Monitoring, Modeling, and Understanding, *Ground Water*, doi:10.1111/j.1745-6584.2009.00654.x.
- Bekins, B.A., M.J. Baedecker, R.P. Eganhouse, and W. N. Herkelrath, 2011, Long-term natural attenuation of crude oil in the subsurface, in *GQ10: Groundwater Quality Management in a Rapidly Changing World (Proc. 7th International Groundwater Quality Conference held in Zurich, Switzerland, 13–18 June 2010, E. Hoehn and M. Schirmer, eds.)*, IAHS Publ. 342, 123-127.
- Green, C.T., J.K. Böhlke, B.A. Bekins, and S.P. Phillips, 2010, Mixing effects on apparent reaction rates and isotope fractionation during denitrification in a heterogeneous aquifer: *Water Resources Research*, v. 46, W08525, doi:10.1029/2009WR008903.
- Molins, S., K.U. Mayer, R.T. Amos, B.A. Bekins, 2010, Vadose Zone Attenuation of Organic Compounds at a Crude Oil Spill Site - Interactions between Biogeochemical Reactions and Multicomponent Gas Transport, *Journal of Contaminant Hydrology*, 112, 15–29, doi:10.1016/j.jconhyd.2009.09.002.
- Cozzarelli, I.M., B.A. Bekins, R.P. Eganhouse, E. Warren, and H.I. Essaid, 2010, In situ measurements of volatile aromatic hydrocarbon biodegradation rates in groundwater, *Journal of Contaminant Hydrology*, v. 111, p.48–64.

- Aiello, I.W. and B.A. Bekins, 2010. Milankovitch-scale correlations between deeply buried microbial populations and biogenic ooze lithology. *Geology*, 38(1): 79-82.
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- Green, C.T., L.J. Puckett, J.K. Böhlke, B.A. Bekins, S.P. Phillips, L.J. Kauffman, J.M. Denver, and H.M. Johnson, 2008, Limited occurrence of denitrification in four shallow aquifers in agricultural areas of the United States: *Journal of Environmental Quality*, v. 37, p. 994-1009.
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- Hostettler, F.D., Y. Wang, Y. Huang, W. Cao, B.A. Bekins, C.E. Rostad, C.F. Kulpa, and A. Laursen, 2007, Forensic fingerprinting of oil-spill hydrocarbons in a methanogenic environment--Mandan, ND and Bemidji, MN: *Environmental Forensics*, v. 8, p. 139-153.
- Bekins, B.A., I. M. Cozzarelli, and G. P. Curtis, 2005, A simple method for calculating growth rates of petroleum hydrocarbon plumes, *Ground Water*, v. 43, no. 6, 817-826.
- Green, C.T., D.A. Stonestrom, B.A. Bekins, K.C. Akstin. 2005. Recharge and transport processes in a sandy soil in the San Joaquin Valley, California. *Water Resources Research*. 41(10) W10414 doi:10.1029/2005WR004061.
- Bekins, B.A., F.D. Hostettler, W.N. Herkelrath, G.N. Delin, E. Warren, and H.I. Essaid, 2005, Progression of methanogenic degradation of crude oil in the subsurface, *Environmental Geosciences*, 12(2):139-152.
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- Essaid, H.I., I.M. Cozzarelli, R.P. Eganhouse, W.N. Herkelrath, B.A. Bekins and G. Delin, 2003, Inverse modeling of BTEX dissolution and biodegradation at the Bemidji, MN crude-oil spill site, *J. Contam. Hydrol.*, 67:269-299.
- Bekins, B.A., I.M. Cozzarelli, E. Warren, E. M. Godsy, 2002, Microbial ecology of a crude-oil contaminated aquifer, in *Groundwater Quality: Natural and Enhanced Restoration of Groundwater Pollution*, S.F. Thornton and S. E. Oswald (eds.), International Association of Hydrological Sciences Publication 275, 57-63.
- Bekins, B.A., I.M. Cozzarelli, E.M. Godsy, E. Warren, H.I. Essaid, and M.E. Tuccillo, 2001, Progression of natural attenuation processes at a crude oil spill site II.

- Controls on spatial distribution of microbial populations, *J. Contam. Hydrol.*, 53:387-406.
- Cozzarelli, I.M., B.A. Bekins, M.J. Baedecker, G.R. Aiken, and R.P. Eganhouse, and M.E. Tuccillo, 2001, Progression of natural attenuation processes at a crude-oil spill site I. Geochemical evolution of the plume, *J. Contam. Hydrol.*, 53: 369-385.
- Bekins, B.A., B.E. Rittmann, J.A. MacDonald, 2001, Natural attenuation strategy for groundwater cleanup focuses on demonstrating cause and effect, *Eos, Transactions, AGU*, January 30, 2001, 82, 5, pp. 53, 57-58.
- National Research Council, 2000, *Natural Attenuation for Groundwater Remediation*, National Academy Press, 274 pp.
- Haack, S.K. and B.A. Bekins, 2000, Microbial populations in contaminant plumes, *Hydrogeology Journal*, 8: 63-76.
- Bekins, B.A., E.M. Godsy, and E. Warren, 1999, Distribution of microbial physiologic types in an aquifer contaminated by crude oil, *Microbial Ecology*. 37:263-275.
- Bekins, B.A., Ean Warren, and E.M. Godsy, 1998, A comparison of zero-order, first-order, and Monod biotransformation models, *Ground Water*. 36:261-268.
- Essaid, H.I., B.A. Bekins, E.M. Godsy, Ean Warren, M.J. Baedecker, and I.M. Cozzarelli, 1995, Simulation of aerobic and anaerobic biodegradation processes at a crude-oil spill site. *Water Resources Research*, 31:3309-3327.
- Bekins, B.A., E.M. Godsy, and D.F. Goerlitz, 1993, Modeling steady-state methanogenic degradation of phenols in ground water. *J. Contam. Hydrol.* 14: 279-294.

***Publications on fluids and geologic processes***

- Gomberg, J.S., Ludwig, K.A., Bekins, B.A., Brocher, T.M., Brock, J.C., Brothers, Daniel, Chaytor, J.D., Frankel, A.D., Geist, E.L., Haney, Matthew, Hickman, S.H., Leith, W.S., Roeloffs, E.A., Schulz, W.H., Sisson, T.W., Wallace, Kristi, Watt, J.T., Wein, Anne, 2017, Reducing risk where tectonic plates collide—U.S. Geological Survey subduction zone science plan: U.S. Geological Survey Circular 1428, 45 p., <https://doi.org/10.3133/cir1428>.
- Weingarten, M., S. Ge, J. W. Godt, B. A. Bekins, J. L. Rubinstein, 2015, High-rate injection is associated with the increase in U.S. mid-continent seismicity, *Science* Vol. 348 no. 6241 pp. 1336-1340, doi: 10.1126/science.aab1345.
- McGarr, A., B. Bekins, N. Burkardt, J. Dewey, P. Earle, W. Ellsworth, S. Ge, S. Hickman, A. Holland, E. Majer, J. Rubinstein, A. Sheehan, 2015, Coping with earthquakes induced by fluid injection, *Science*, Vol. 347, no. 6224, pp. 830-831, doi: 10.1126/science.aaa0494.
- Keranen, K. M., M. Weingarten, G. A. Abers, B. A. Bekins, S. Ge, 2014, Sharp increase in central Oklahoma seismicity since 2008 induced by massive wastewater injection, *Science*, 25 July 2014: Vol. 345 no. 6195, pp. 448-451, doi: 10.1126/science.1255802.
- Bekins, B.A., 2012, Book Review, *Earthquakes and Water*, by Wang, C.-Y. and Manga, M., *Geofluids*, 12:261-263, doi: 10.1111/j.1468-8123.2012.00366.x.

- Bekins, B.A., Matmon, D., Screaton, E.J. and Brown, K.M., 2011, Reanalysis of in situ permeability measurements in the Barbados décollement. *Geofluids*, 11(1): 57-70, doi: 10.1111/j.1468-8123.2010.00310.x.
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- Fulton, P.M., D.M. Saffer, B.A. Bekins, 2009, A critical evaluation of crustal dehydration as the cause of an overpressured and weak San Andreas Fault, *Earth and Planetary Science Letters*. 284, 447–454, doi:10.1016/j.epsl.2009.05.009.
- Bekins, B.A. and E.J. Screaton, 2007, Pore pressure and fluid flow in the Northern Barbados Accretionary Complex: A synthesis, *in "The Seismogenic Zone of Subduction Thrust Faults"*, MARGINS Theoretical and Experimental Earth Science Series, v. 2, T. Dixon and J. C. Moore Editors. Columbia University Press, p. 148–170.
- Bekins, B.A., A.J. Spivack, E.E. Davis, L.A. Mayer, 2007, Dissolution of biogenic ooze over basement edifices in the equatorial Pacific with implications for hydrothermal ventilation of the oceanic crust, *Geology*, v. 35; no. 8; p. 679–682.
- Matmon, D., and B.A. Bekins, 2006, Hydromechanics of a high taper angle, low-permeability prism: A case study from Peru, *J. Geophys. Res.*, 111, B07101, doi:10.1029/2005JB003697.
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- Ge, S., B.A. Bekins, J. Bredehoeft, K. Brown, E.E. Davis, S.M. Gorelick, P. Henry, H. Kooi, A.F. Moench, C. Ruppel, M. Sauter, E. Screaton, P.K. Swart, T. Tokunaga, C.I. Voss, and F. Whitaker, 2003, Fluid flow in sub-sea floor processes and future ocean drilling, *EOS, Transactions, American Geophysical Union*, 84(16) p.145, 151-152.
- Saffer, D.M. and B.A. Bekins, 2002, Hydrologic controls on the morphology and mechanics of accretionary wedges, *Geology*, 30:271-274.
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- Stauffer, P., and B.A. Bekins, 2001, Modeling consolidation and dewatering near the toe of the northern Barbados accretionary complex *J. Geophys. Res.*, 106:6,369-6,383.
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- Moore, J.C., A. Klaus, N.L. Bangs, B.A. Bekins, et al., 1998, Consolidation patterns during initiation and evolution of a plate boundary decollement zone: Northern Barbados accretionary prism. *Geology*, 26:811-814.
- Saffer, D.M. and B.A. Bekins, 1999, Fluid budgets at convergent plate margins: Implications for the extent and duration of fault zone dilation. *Geology*, 27:1095-1098.
- Saffer, D.M. and B.A. Bekins, 1998, Episodic fluid flow in the Nankai Accretionary Complex: Timescale, geochemistry, flow rates, and fluid budget. *J. Geophys. Res.*, 103:30,351-30,370.
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