

Dorothy J. Vesper

G37 Brooks Hall
West Virginia University
Dept. of Geology and Geography

304-293-9816
djvesper@mail.wvu.edu
<http://pages.geo.wvu.edu/~dvesper>

EDUCATION

Ph.D. in Geosciences, 2002. The Pennsylvania State University, University Park, PA. Dissertation: *Transport and storage of trace metals in a karst aquifer: An example from Fort Campbell, Kentucky*; Advisor William B. White

M.S. in Environmental Pollution Control, 1988. The Pennsylvania State University, University Park, PA. Thesis: *A Raman spectroscopic study of aqueous speciation in the system Al_2O_3 - P_2O_5 - H_2O*

B.S. in Geology, 1986. Juniata College, Huntingdon, PA

PROFESSIONAL EXPERIENCE

08/19 – Present Professor, West Virginia University
08/10 – 08/19 Associate Professor, West Virginia University
08/04 – 08/10 Assistant Professor, West Virginia University
08/02 – 08/04 Visiting Assistant Research Professor, West Virginia University
08/98 – 08/02 Graduate Assistant, Pennsylvania State University
08/91 – 01/02 Geologist at A. D. Little, Inc. (Part Time: 8/98 – 1/02)
10/88 – 08/91 Project Hydrogeologist at ERM-New England, Inc.

RECOGNITIONS AND AWARDS

Fellow of the Geological Society of America, 2018
Karst Waters Institute Distinguished Service Award, 2017
Board of Directors of the Karst Waters Institute, 2009 - present
Phi Kappa Phi Honor Society, January 2000
Geological Society of America, Outstanding Student Research Award, 1999

PUBLICATIONS IN PEER-REVIEWED JOURNALS (* INDICATES STUDENTS)

Vesper DJ, Moore JE, Edenborn HM (2019) Tufa Deposition Dynamics in a Freshwater Karstic Stream Influenced by Warm Springs. *Aquatic Geochemistry*. <https://doi.org/10.1007/s10498-019-09356-9>

Yu H, Khan AU, Subramanian S, Vesper D, Van Aken, B. (2019) Microbial Communities in Chesapeake & Ohio Canal National Historical Park and Their Function as Indicators of Water Quality. *Geomicrobiology Journal* 36, 673-682.

Vesper DJ, Smaldone D, Feller DJ (2018) Assessing the relative vulnerability of sensitive karst habitats containing rare, threatened, and endangered species in the Chesapeake and Ohio Canal National Historical Park. *Park Science*, 34(1): 60-69

- Edenborn HM, Howard BH, Sams JI, Vesper DJ, Edenborn SL (2017) Passive detection of Pb in water using rock phosphate agarose beads. *J Hazardous Materials* 336: 240-248
- Vesper DJ, Moore* JE, Adams* JP (2016) Inorganic carbon dynamics and CO₂ flux associated with coal-mine drainage sites in Blythedale PA and Lambert WV, USA. *Environmental Earth Sciences* 75(4):340-353
- Vesper DJ, Edenborn HM, Billings AA, Moore* JE (2015). A field-based method for determination of dissolved inorganic carbon in water based on CO₂ and carbonate equilibria. *Water, Air & Soil Pollution* 226:28-39
- Anaya* AA, Padilla I, Macchiavelli R, Vesper DJ, Meeker JD, Alshawabkeh AN (2014) Estimating Preferential Flow in Karstic Aquifers Using Statistical Mixed Models. *Groundwater*: 52(4): 584-596
- Odenheimer* J, Skousen J, McDonald LM, Vesper DJ, Mannix* M, Daniels WL (2014) Predicting release of total dissolved solids from overburden material using acid-base accounting parameters. *Geochemistry: Exploration, Environment, Analysis*, first published on November 7, doi:10.1144/geochem 2014-276
- Baek K, Kasem N, Ciblak A, Vesper D, Padilla I, Alshawabkeh AN (2013) Electrochemical removal of selenate from aqueous solutions. *Chemical Engineering Journal* 215–216(0): 678-684
- Brubaker* TM, Stewart BW, Capo RC, Schroeder KT, Chapman* EC, Spivak-Birndorf* LJ, Vesper DJ, Cardone CR, Rohar PC (2013) Coal fly ash interaction with environmental fluids: Geochemical and strontium isotope results from combined column and batch leaching experiments. *Applied Geochemistry* 32, 184-194.
- Sharma S, Sack* A, Adams* JP, Vesper DJ, Capo RC, Hartsock A, Edenborn HM (2013) Isotopic evidence of enhanced carbonate dissolution at a coal mine drainage site in Allegheny County, Pennsylvania USA. *Applied Geochemistry* 29: 32-42
- Ghasemizadeh R, Hellweger F, Butscher C, Padilla I, Vesper D, Field M, Alshawabkeh A (2012) Review: Groundwater flow and transport modeling of karst aquifers, with particular reference to the North Coast Limestone aquifer system of Puerto Rico. *Hydrogeol J*: 1441-1461
- Vesper DJ and Edenborn HM (2012) Determination of free CO₂ in emergent groundwaters using a commercial beverage carbonation meter. *Journal of Hydrology* 438–439: 148–155
- Vesper DJ and Smiley* MJ (2010) The distribution and diel cycling of trace and rare earth elements in a coal mine drainage treatment wetland, Lambert Run, West Virginia. *Applied Geochemistry* 25(6): 795-808
- Vesper DJ, Grand* RV, Ward* K and Donovan JJ (2009) Geochemistry and implications for structural control in a spring-dense karst watershed, the Appalachian Great Valley, West Virginia, USA. *Environmental Geology* 58(3): 667-678
- Vesper DJ, Roy* M and Rhoads* CJ (2008) Selenium distribution and mode of occurrence in the Kanawha Formation, southern West Virginia, U.S.A. *International Journal of Coal Geology* 73: 237-249
- Vesper DJ and White WB (2004) Spring and conduit sediments as storage reservoirs for heavy metals in karst aquifers. *Environmental Geology* 45(4): 481-493
- Vesper DJ and White WB (2004) Storm pulse chemographs of saturation index and carbon dioxide pressure: Implications for shifting recharge sources during storm events in a karst aquifer at Fort Campbell, Kentucky/Tennessee, USA. *Hydrogeology Journal* 12(2): 135-143
- Vesper DJ and White WB (2003) Metal transport to karst springs during storm flow; An example from Fort Campbell, Kentucky/Tennessee, U.S.A. *Journal of Hydrology* 276: 20-36

SELECTED BOOK CHAPTERS

- Vesper DJ, Bravo-Ruiz* H, Laskoskie* AF, Edenborn HM (2018) Development and Testing of Hydrogel Beads as Potential Floating Tracers of Contaminant Movement in Karst Aquifers. In *Karst Groundwater Contamination & Public Health; Beyond Case Studies*. Springer International Publishing AG, Cham Switzerland, 145-153
- Padilla IY and Vesper DJ (2018) Fate, Transport, and Exposure of Emerging and Legacy Contaminants in Karst System: State of Knowledge and Uncertainty. In *Karst Groundwater Contamination & Public Health; Beyond Case Studies*. Springer International Publishing AG, Cham Switzerland, 33-49
- Cordero JF, Meeker JD, Loch-Caruso R, Giese R, Padilla I, Vesper D, Kaeli D, Sheahan T, Brown P, Velez-Vega C, Alshawabkeh A (2018) Team Science Applied to Environmental Health Research: Karst hydrogeology and preterm birth in Puerto Rico. In *Karst Groundwater Contamination & Public Health; Beyond Case Studies*. Springer International Publishing AG, Cham Switzerland, 17-25
- Vesper DJ (2012) Contamination of cave waters by heavy metals. In *The Encyclopedia of Caves, 2nd Ed.*, D Culver and W White (Eds), Academic Press, Amsterdam, 161-166
- Vesper DJ (2009) Aquifer in a bottle: detecting geologic origin from bottled water chemistry. In *The Integrated Approach to Chemistry Laboratory: Selected Experiments*, P Basu and ME Johnson (Eds), DEStech Publications Inc., Lancaster PA, 19-24
- Vesper DJ (2008) Applied issues: Current research status. In *Frontiers of Karst Research*, JB Martin and WB White (Eds), Karst Waters Institute Special Publication 13, Karst Waters Institute, Leesburg VA, 65-73

SELECTED PROCEEDING PAPERS

- Shokri* M, Vesper DJ, Herman EK, Rajic L, Hetrick K, Padilla I, Alshawabkeh A (2018) Bulk chemistry of karst sediment deposits. In: Sasowsky ID, Byle MJ, Land L (Eds.), *Proceedings of the 15th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst*. National Cave and Karst Research Institute, Carlsbad NM, 115-120
- Bausher* E, Downey* AR, Vesper DJ (2018) Geochemical Comparison of Karst and Clastic Springs in the Appalachian Valley & Ridge Province, Southeastern West Virginia and Central Pennsylvania. In: Sasowsky ID, Byle MJ, Land L (Eds.), *Proceedings of the 15th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst*. National Cave and Karst Research Institute, Carlsbad NM, 121-128
- Hetrick* K, Rajic L, Alshawabkeh A, Shokri* M, Vesper D (2018) The Role of Suspended Sediments on the Electrochemical Remediation of Karst Groundwater. In: Sasowsky ID, Byle MJ, Land L (Eds.), *Proceedings of the 15th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst*. National Cave and Karst Research Institute, Carlsbad NM, 147-152

OTHER PUBLISHED ITEMS

- Herman JS, Vesper DJ, and Herman EK (2016) Meeting Report: Groundwater contamination in karst regions affects human health, *Eos*, 97, <https://doi.org/10.1029/2016EO056011>. Published on 20 July 2016
- Vesper DJ (2013) Book Review/ Water in Karst: Management, Vulnerability and Restoration by Neven Kresic. *Groundwater*: 51(6) 656

ACTIVE GRANTS

Project PRoTECT (Puerto Rico Test Site for Exploring Contamination Threats). Funded by National Institute of Environmental Health (NIEH), Multiproject Program Grants (P42) Superfund Basic Research Grants (via a subcontract with Northeastern Univ.) Role: PI for WVU, Currently on Year 10 of project.

Appalachian Freshwater Initiative. Funded by the NSF EPSCOR program. Role: Investigator. 5-year grant beginning in 2015.

COMPLETED GRANTS – EXTERNAL

Monroe Source Water Vulnerability. Funded by the WV Dept. of Health and Human Services. Role: PI. 2017-2018.

Project PRoTECT (Puerto Rico Test Site for Exploring Contamination Threats). Funded by National Institute of Environmental Health (NIEH), Multiproject Program Grants (P42) Superfund Basic Research Grants (via a subcontract with Northeastern Univ.).

Appalachian Freshwater Initiative. Funded by the NSF EPSCOR program. Role: Investigator. 5-year grant beginning in 2015.

Selenium sorption. Funded by DOI Office of Surface Mining, Reclamation and Enforcement (OSMRE) via the WV ADTI Cooperative Agreement. Role: co-PI (Louis McDonald PI. WVU Soils). 6/15 – 5/17. Total Project \$200,000. Vesper task \$28,578.

Small-meeting support. Funded by the National Institute of Environmental Health Sciences (NIEHS). Role: PI. Funding to support the Karst Waters Institute meeting on Karst Groundwater Contamination & Public Health. Role: PI. 9/15 – 8/16.

Assessing the vulnerability of sensitive karst habitats containing RTE [Rare, Threatened and Endangered] species in CHOH [Chesapeake and Ohio Canal National Historical Park]. Funded by the National Park Service National Capital Region. Role: PI. 8/11 – 9/15.

Selenium diel cycles & sorption kinetics. Funded by DOI Office of Surface Mining, Reclamation and Enforcement (OSMRE) via the WV ADTI Cooperative Agreement. Role: PI (Louis McDonald, WVU Soils, Co-PI). 5/14 – 4/15. Total project \$100,000.

Field Monitoring of CO₂ Funded by URS & Dept. of Energy, National Energy Technology Lab, Role: PI. 11/13 – 11/14.

(Bio) geochemical indicators and processes for development of novel MVA tools: Comparison of CO₂-measurement methods, rare earth element indicators and sensors in complex geochemical and geological settings. Funded by URS & Dept. of Energy, National Energy Technology Lab, Role: PI. 1/11 – 12/11.

Cave Assessments in Chesapeake and Ohio Canal National Historical Park. Funded by the National Park Service, Role: PI. 1/11 – 5/12.

Development of a GIS database and assessment of available hydrogeologic data for NCR [National Capital Region] parks with karst geology. Funded by the National Park Service. Role: PI. 7/09 – 12/10.

Novel geochemical tools to predict and monitor the fate and impact of subsurface CO₂ Funded by URS & Dept. of Energy, National Energy Technology Lab, Role: PI. 1/10 – 12/10.

Regional collaboratory for the study of trace elements in the environment associated with fossil fuels. Funded by Research and Development Solutions, LLC (Dept of Energy, National Energy Technology Lab - NETL). Role: PI for task, Collaborators: King and Herd (WVU), Capo and Stewart (U Pitt). 7/06 – 1/10. Reported total funds for Vesper's tasks

Project FLOW: Building linkages between students, educators and community groups on the West Run Watershed, Morgantown. Funded by the West Virginia Commission for National and Community Service, Project FLOW (Future Leaders of Watersheds). Role: PI. 1/09 – 7/09,

Quality and impact of transient metal loading on water quality. Funded by U.S. Department of Interior, Office of Surface Mining, as part of the ADTI Technical Support Cooperative Agreement (Task 5). Role: PI for task. 9/07 – 1/09.

Impacts of transient water chemistry on metal loading. Funded by U.S. Department of Interior, Office of Surface Mining, as part of the ADTI Technical Support Cooperative Agreement (Task 6). Role: PI for task. 8/06 – 9/07.

Urbanization and climate change impacts on the Great Valley Karst Aquifer, West Virginia-Virginia. Funded by National Research Initiative Competitive Grants Program, U.S. Department of Agriculture and Cooperative State Research, Education and Extensive Service. Role: co-PI with J Donovan. 7/03 – 7/06. Total grant amount provided (not separated into task by investigator)

Selenium identification and removal from contaminated surface and groundwater. Funded by the U.S. Department of Interior, Office of Surface Mining. Role: PI for task, 8/03 – 8/06, (date and budget for 3 grants total).

Water resources research initiative for Peters Mountain Aquifer. Funded by the WV Water Research Institute. Role: Investigator (PI J Donovan). 3/04 – 9/06. Total grant amount provided (not separated into task by investigator).

Springs, source water areas and potential for high-yield aquifers along the Cacapon Mountain anticline in Morgan County, Wet Virginia. Funded by the West Virginia Conservation Agency, Eastern Panhandle Conservation District. Role: Joint with PI J Donovan. 5/04 – 4/06. Total grant amount provided (not separated into task by investigator).

Hydraulic connections and impacts on water supply in the Great Valley Karst Aquifer. A case study in Martinsburg, WV. Funded by USGS Water Research Institute 104(e) Program (State Competitive Grants). Role: Co-PI with J Donovan. 3/03 – 2/05.

SELECTED INVITED PRESENTATIONS

Vesper DJ (2017) CO₂ from springs and spring-like portals to the underworld: challenging methods and conventions. Geological Society of America, September 2017, Seattle WA.

Vesper DJ (2017) What does coal mine discharge have in common with hypogene cave systems? Colloquium at University of Pittsburgh. 4/13/17.

Vesper DJ (2015) Contaminant Movement in Karst... What We Think We Know. Talk given at the Edwards Aquifer Authority, San Antonio TX, 5/21/15.

Contaminant Movement in Karst... What We Think We Know. Talk given at the Pittsburgh Geological Society, Greentree PA, 9/2014.

The Vulnerability of Karst Aquifers – Is the Paradigm True? Given at the Cosmos Club, Washington DC, 9/2012.

Karst settings and environmental risk: a discussion of the issues and the current state of the science. Keynote speaker for Growing On Karst, 2011. 9/12-14/11. Shepherdstown WV.

TEACHING

West Virginia University

Aqueous Geochemistry (GEOL 588) – 3 credits. This class addresses inorganic geochemistry as it relates to water systems and focuses on quantitative problem solving. The class includes computer speciation modeling as well as hand calculation and data interpretation. In addition to attracting geology students, it regularly includes students from soil chemistry, forestry, and biology.

Applied Field Geochemistry (GEOL 591) – 3 credits. A hands-on course in which students collect and analyze water samples and incorporate data into interpretative reports. The course is designed to teach students the needed techniques to conduct field research in geochemistry.

Special Topics in Geochemistry (GEOL 591) – 3 credits. Reading and discussion class. In addition to reviewing papers, students recalculate and reinterpret data from the papers.

Contaminant Transport Geochemistry (GEOL 580) – 3 credits. Upper level graduate course on the geochemistry of organic contaminants. The focus is on solving quantitative problems, critically reading journal articles, and writing.

Environmental Geochemistry (GEOL 488) – 3 credits. An upper level undergraduate course that focuses on how basic geochemistry relates to earth process. This course is designed around a field trip – conducted on bicycles – during which students collect samples and data that they used and present throughout the semester. It also includes an outreach component that requires students to develop their public communication skills.

Karst Geology (GEOL 466/666) – 3 credits. An elective class for undergraduates taught concurrently with a graduate class. Covers physical and chemical aspects of cave and karst systems. Two field trips included.

Geochemistry of the Earth (GEOL 388) – 3 credits. An elective course for geology majors that gives an overview of the “big picture” of geochemistry. Focused on quantitative skill development and group work.

Planet Earth (GEOL 101) – 3 credits. A large introductory lecture class with up to 340 students. Includes in-class exercises to promote student involvement and attendance.

CURRENT STUDENT ADVISEES AND THESIS TOPICS

Mitchell, Jonney (Ph.D. Geology). Measurement of CO₂ and alkalinity in mineral waters and coal-mine drainage

Lee, Kyle (M.S. Geology). Analysis of carbon dioxide flux from acid mine drainage sites in West Virginia and southern Pennsylvania

Riddell, Jill (Ph.D. Geology) Comparative tracer tests for assessing contaminant movement in karst

Downey, Autum (M.S. Geology) Carbon in Puerto Rico cave sediments; impacts of extreme storm events

Bell, Matt (M.S. Geology) Variability of CO₂ in coal mine discharge

COMPLETED STUDENT ADVISEES AND THESIS TOPICS

Bausher, Emily (2018, M.S. Geology): Qualitative and quantitative analysis of carbonate waters in the Peter's Mountain region of Monroe County, WV

Shokri, Mohammad (2017, M.S. Geology, Project): Determination of physicochemical characteristics of cave sediments for the assessment of the impact on electrokinetic remediation of karst groundwater

Figuerola-Tyler, Christian (2015, M.S. Geology) Influence of mycorrhizal fungi on soil geochemistry and plant uptake of cadmium and zinc: greenhouse and soil studies of Palmerton Zinc Superfund Site, Pennsylvania, U.S.A.

Bravo-Ruiz, Habib (2015, M.S. Geology) Detection of fluorescent beads for better understanding of LNAPL transport in karst

Riddell, Jill (2015, M.S. Geology) Coupled diel cycling of inorganic carbon and metals in mine drainage waters

Waltemyer, Kendi (2015, M.S. Geology) Forced diel cycles of selenium

Moore, Jonathan (2012, M.S. Geology) An analysis of mineral spring geochemistry and controls of spring locality in the Sweet Springs Valley, Alleghany Co. Virginia and Monroe Co. West Virginia

Adams, James (2012, M.S. Geology) Flux of CO₂ from coal mine drainage sources

Laskowski, Amanda (2013, M.S. Geology) Particulate tracers as models for contaminant transport in karst aquifers

Rhodes, Christina (2011, M.S. Geology, Project) Chemical and stratigraphic trends for Se from a coal mine in Boone County, WV

Ward, Kristen (2010, M.S. Geology, Project) Characterization of the chemical response of an urban creek and adjacent spring to a large scale recharge event, Martinsburg, Berkeley County, WV

Harris, Daniel (2008, M.S. Geology) Diel cycling of iron species in a natural wetland

Corder, Lacoa (2008, M.S. Geology) A hydrologic and hydrochemical study of the Cacapon Anticline

Smilley, Michael (2007, M.S. Geology) Diel cycling of trace metals in a constructed wetland

Roy, Mimi (2005, M.S. Geology): Modes of occurrence of selenium in WV coals

Grand, Rachael (2005, M.S. Geology) A study of the karst springs in the Tuscarora Creek Watershed, WV

Fisher, Kayse (2004, M.S. Geology, Project) Interpretation of water chemistry data from springs

PROFESSIONAL SERVICE

Friends of Karst

2017. Planned and hosted a 2017 meeting of the Friends of Karst Symposium (with Maria Perez). The meeting included 11 full-length talks, 11 snap talks and 10 posters. There were ~75 attendees who came from 16 universities, 7 WVU programs, 7 NGS, 5 government agencies, and 2 private companies.

Karst Waters Institute

2009 – Current. Board of Directors, Karst Waters Institute

2018. KWI rep. on Barry Beck Memorial Scholarship committee for the 2018 Sinkholes Meeting (an international conference). Co-chaired the committee, organized the silent auction and its proceeds.

2014-2016. Proposed idea and chaired planning committee for the Karst Groundwater Contamination & Public Health: Beyond Case Studies held in January 2016, San Juan, Puerto Rico. The meeting was attended by 70 people from 7 countries including 16 US States and Puerto Rico; funds were obtained from NSF and NIH to support the meeting. KWI awarded the Distinguished Service Award for this effort. A Springer “Advances in Karst” book was published at the outcome of this meeting.

2007. Break-out group co-leader for the Karst Water Institute (KWI) invited workshop: New Directions in Karst Research, May 2007. This workshop was sponsored by KWI and NSF. Authored overview documents, led discussions at meeting, co-authored meeting outcome manuscript.

Geological Society of America:

2018: Dye Tracing and Emerging Environmental Tracers in Hydrogeology. Proposed and co-convened session with Doug Gouzie (Missouri State Univ.)

2018: GSA Student Mentor Program

2013: Transport and Transformation of Non-Solute Materials in Karst Aquifers. Proposed and co-convened session with Ellen Herman (Bucknell Univ) and Michael Sinreich (Swiss Federal Office for the Environment)

2006: Epikarst to Conduits: Quantitative Methods Applied To Monitoring and Modeling of Karst Aquifers. Proposed and co-convened session with Ralph Davis, University of Arkansas

2005: Springs: Keys to Understanding Geochemical Processes in Aquifers. Proposed and co-convened session with Brian Katz, USGS

2015, 2017: Judged undergraduate student posters for the Hydrogeology Division.

Reviewed proposals for National Science Foundation (NSF); National Institute of Health (NIH); Wisconsin Water Research Institute; US Geological Survey; Swiss National Science Foundation, Petroleum Research Fund of the American Chemical Society.