Rachel McQuiggan

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PROFESSIONAL EXPERIENCE

Delaware Geological Survey, University of Delaware, Newark, DE
Research Associate III — January 2022 – Present
Research Associate II — June 2017 – December 2021

- Collects and interprets geologic and hydrogeologic data through on-site testing, reviewing publications and State and Federal databases, and coordinating with outside agencies
- Analyzes data to determine spatial distribution and hydrogeologic relationships to enhance existing and develop new groundwater models
- Develops and maintains relational databases to aid in research and dissemination of data, including creation of automated database and web queries, formatting macros and processing codes and database input forms
- Engages with stakeholders to identify important issues to Delaware communities and encourage participation and cooperation in research efforts; outreach has led to a local farmer reconfiguring their irrigation pond water supply to prevent saltwater intrusion, Dover Water adjusted their pumping schedule to address future concerns around aquifer depletion
- Prepares technical reports, peer-reviewed publications, project plans, budgets, proposals and maps to support ongoing and future research projects
- Coordinates and supervises outside contractors and students during field efforts including monitoring well installation, soil logging, hydraulic testing and water quality sampling

International Asbestos Testing Laboratory, Mt. Laurel, NJ — October 2013 – May 2017
Senior Laboratory Analyst

- Analyzed bulk material and air samples for asbestos minerals using the following techniques: polarized light microscopy (PLM), transmission electron microscopy (TEM), electron diffraction, energy-dispersive X-ray spectroscopy (EDX/EDS)
- Characterized, quantified and identified fibrous minerals and non-crystalline fibers from observed characteristics such as optical properties, crystal structure and chemical signature
- Additional responsibilities included sample management, quality control and data entry

Fuss & O'Neill, Inc., Manchester, CT — October 2007 – May 2013
Hydrogeologist, Assessment & Remediation, Brownfields Group

- Performed environmental subsurface investigation and remediation at various sites throughout New England, including sites that fall under RCRA, CERCLA, State and Federal regulations
- Created groundwater elevation maps and contaminated soil and groundwater plume maps
- Evaluated chemical contaminant data to define the nature and extent of contamination and determine the potential fate and transport of contaminants and remedial options, including in-situ chemical methods
- Wrote technical reports including conceptual site models, Phase I/II/III reports, project plans, investigation reports, technical memoranda, remedial action plans and remediation reports
- Oversight and management of field staff during site investigations

EDUCATION

Additional Coursework and Training, University of Delaware, Newark, Delaware
Environmental Computing with R/Spatial Computing with Python (GEOG473/673) — Fall 2019

Hydrogeology Seminar: Groundwater Modeling (GEOL630) Spring 2019

McGill University, Montreal, Quebec, Canada 2003-2007
Bachelor of Arts, Classical Studies
Minor, Earth & Planetary Science

PUBLICATIONS

McQuiggan, R., Andres, A.S., He, C., Hingst, M., McKenna, T., & Michael, H.A. (in draft). Kent County Groundwater Monitoring Project: Hydrogeology and Saltwater Intrusion Dynamics in the Columbia Aquifer of Eastern Kent County. Delaware Geological Survey: Report of Investigations No. 86.

Peters, C.N., Kimsal, C., Frederiks, R.S., Paldor, A., **McQuiggan, R.**, & Michael, H.A. (2022). Groundwater pumping causes salinization of coastal streams due to baseflow depletion: Analytical Framework and application to Savannah River, GA. *Journal of Hydrology*, 604, 127238. https://doi.org/10.1016/j.jhydrol.2021.127238

Andres, A.S., **McQuiggan, R.**, He, C., & McKenna, T. (in press). Kent County Groundwater Monitoring Project: Results of Hydrogeological Studies. Delaware Geological Survey: Report of Investigations No. 85.

Andres, A.S., **McQuiggan, R.**, & He, C. (2019). Kent County Groundwater Monitoring Project: Results of Subsurface Exploration. Delaware Geological Survey: Open-File Report No. 53.

CONFERENCE PRESENTATIONS & PUBLISHED ABSTRACTS

Hingst, M., **McQuiggan, R.,** Andres, A.S., Michael, H. (December 2021). *Saltwater Intrusion – Early awareness leading to early mitigation*. Abstract #H45W-1482. Poster presented at AGU Fall Meeting 2021, San Francisco, CA, 13-17 Dec.

McQuiggan, R., Andres, A.S. (September 2021). *Field Study of Deicing Salt Impacts On Groundwater From Stormwater Infiltration Best Management Practices*. Oral presentation at the American Water Resource Association (AWRA) Mid-Atlantic Conference 2021, held virtually, 22-24, Sept.

Andres, A.S., **McQuiggan, R.** (December 2019). *Challenges of characterizing impacts of de-icing salt in a heterogeneous aquifer*. Abstract #495277. Poster presented at AGU Fall Meeting 2019, San Francisco, CA, 9-13 Dec.

Hingst, M., **McQuiggan, R.,** Peters, C., Andres, A.S., Michael, H. (December 2019). *A-Salt on Delaware Farmland: Investigation of Pathways and Dynamics of Saltwater Intrusion near Dover*. Abstract #617689. Poster presented at AGU Fall Meeting 2019, San Francisco, CA, 9-13 Dec.

McQuiggan, R., Hingst, M., Michael, H., Andres, A.S., and He, C. (March 2019). *Flow Dynamics and Salinity of Groundwater and Surface Water in East Dover*. Poster presented at DENIN Symposium Series II: Future of Water in the Mid-Atlantic: Agriculture, Restoration and Technology: Stroud Water Research Center, Avondale, PA.

McQuiggan, R. and Andres, A.S. (September 2018). *Groundwater Level Decline in the Piney Point Aquifer of Delmarva*. Oral presentation at the annual Maryland Groundwater Symposium: Baltimore, Maryland. Abstract available here: http://www.mcet.org/Assets/mcet/MDE/2018GWSGuide.pdf

RECENT/CURRENT GRANT-FUNDED RESEARCH

PI — Project Period

- *DelDOT Deicing Salt Study, FY22* — *July 2021 – June 2022*

  Expansion of an existing water level monitoring network to include ambient groundwater chemistry and quality with a focus on aquifers that contribute to water supply systems

Co-PI — Project Period

- *Delaware Groundwater Monitoring Network (DE GWMN)* — *February 2021 – ongoing*
  Expansion of an existing water level monitoring network to include ambient groundwater chemistry and quality with a focus on aquifers that contribute to water supply systems
- *DelDOT Deicing Salt Study, FY21* — *July 2020 – June 2021*
  Investigating the impacts to groundwater from winter roadway salt applications through monitoring DelDOT-managed stormwater best management practice sites

Project Leadership

- *NSF Critical Zone Collaborative Network* — *September 2020 – September 2025*
  Data Manager for "The Coastal Critical Zone: Processes that transform landscapes and fluxes between land and sea" coordinating data acquisition, storage, processing and management with individual group leads and the larger CZCN Data Hub

Participant

- *NSF EPSCoR Track II – Project WiCCED* — *September 2018 – September 2023*
  Investigating the pathways and dynamics of salinization to groundwater and surface water in the east Dover area, an area with competing water demands of shallow and deep aquifers
- *National Groundwater Monitoring Network (NGWMN)* — *July 2020 – June 2022*
  Managing and operating an automated, high-frequency monitoring network and associated data used to evaluate long-term trends in the major aquifers of Delaware
- *Groundwater and Saline Intrusion Monitoring, Kent County, Delaware* — *June 2017 – September 2021*
  Install new infrastructure and monitoring groundwater conditions in areas of Delaware that have been identified as spatial data gaps
- *DelDOT Deicing Salt Study, Years 1 & 2* — *December 2018 – June 2020*
  Investigating the impacts to groundwater from winter roadway salt applications through monitoring DelDOT-managed stormwater best management practice sites

PROFESSIONAL AFFILIATIONS

Geological Society of America

COMMUNITY ASSOCIATIONS

Kent County Working Group — April 2018 – Present

- Engage with State agencies, local water purveyors and stakeholders to discuss ongoing water resource concerns and establish goals for future research

SUPERVISORY EXPERIENCE

University of Delaware, Newark, DE

Project advisor to summer research intern (Kim Bieksha) June – August 2020

- Worked with intern and supervisor (Dr. Chelsea Peters) to come up with research project idea
- Advised on data acquisition, management and processing to achieve research goals

Supervisor to summer intern (Monica DiBartolomeo) May – August 2019

- Instructed on basic field monitoring principles and how to operate sensors and monitoring equipment
- Shared scheduling duties with Jaime Tomlinson of the DGS in order to accomplish summer field goals for two projects
- Developed the internship into a summer research project using data collected during the summer and coordinated with Dr. Dana Veron (UD CEOE) for the intern to receive 3-credits

Supervisor to undergraduate field assistants (Colin McGee and Edward Weiss) May – August 2018

- Taught field and monitoring techniques
- Instructed students on basic data processing and management and relational database skills

TECHNICAL SKILLS

Software: Microsoft Office, ArcGIS, AutoCAD, Grapher, AquiferTest Pro, Visual MODFLOW Flex, Solinst Levelogger software, Win-situ, Campbell Sci LoggerNet

Languages: SQL, VBA, Python, R

FIELD WORK & LABORATORY SKILLS

Monitoring well installation, hydraulic testing, soil coring and logging, rock core logging, pressure-temperature-conductivity sensors, multi-parameter sondes, automated sensors and external data loggers, geophysical logging (gamma, induction/EM, caliper), soil sampling, groundwater sampling, level surveying, polarized light microscopy, transmission electron microscopy