NATIONAL ACADEMIES Sciences Engineering Medicine

**Committee on Earth Resources | Board on Earth Sciences and Resources**

# Subsurface Pore Space in Multi-Use Basins

**Opportunities for Collaboration and Communication**

## MONDAY, NOVEMBER 27, 2023

The subsurface is being targeted for a number of uses and processes: oil and gas recovery, geothermal development, enhanced oil recovery, wastewater injection, carbon sequestration, natural gas storage, hydrogen recovery and storage, and increased mining activity. How will these industries overlap, compete, or complement each other?

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| **11:00 EDT** | **WELCOME** | |
| **11:05–11:20** | **Overview of subsurface pore space uses** | Sallie Greenberg |
| **11:25–11:40** | **Case study of multi-use basin** | Zach Pendleton |
| **11:45–12:30** | **PANEL DISCUSSION #1 – Permitting and potential interferences in multi-use basins**<br>Nick Tew, Kara Fornstrom, Kimberly Wurtz | |
| **12:30–1:00** | **BREAK** | |
| **1:00–1:45** | **PANEL DISCUSSION #2 – Environmental impacts and safety in multi-use basins**<br>Darin Damiani, Matthew Minnick, Scott Anderson | |
| **1:45–2:00** | **BREAK** | |
| **2:00–2:45** | **SUMMARY PANEL DISCUSSION – Collaboration and communication**<br>All prior panelists welcome | |
| **3:00** | **MEETING ADJOURNS** | |

## SPEAKER BIOS

**Scott Anderson** is the Senior Director, Energy Transition at the Environmental Defense Fund (EDF). He has served as EDF's point person on policies relating to the land and water impacts of oil and natural gas development and to the geological sequestration of carbon dioxide since 2005. Scott focuses on reducing the environmental footprint of oil and gas operations. Scott spent many years in the oil and gas industry prior to joining Environmental Defense Fund. He is the former Executive Vice President and General Counsel of the Texas Independent Producers and Royalty Owners Association (TIPRO). He was the long-time Secretary of the LIAISON Committee of Cooperating Oil and Gas Associations and currently is a member of the Committee of Visitors for the Bureau of Economic Geology at the University of Texas at Austin.

**Darin Damiani** is the Carbon Storage Program Manager for the U.S. Department of Energy's Office of Fossil Energy, where he manages a program that supports a portfolio of R&D projects and initiatives aimed at advancing geologic $CO_2$ storage technologies. Darin began a career focused on carbon capture utilization and storage (CCUS) in 2007 when he joined the DOE's National Energy Technology Laboratory (NETL). While at NETL Darin was the project manager for a variety of technology R&D projects in support of the Carbon Storage Program including the Midwest Geological Sequestration Consortium (MGSC), which is one of the seven Regional Partnerships that have been advancing CCUS technologies and infrastructure needed to implement large-scale $CO_2$ storage in different regions and geologic formations of North America. Darin completed his Masters in Environmental Engineering from Manhattan College, NY and a B.E. in Environmental Engineering from Hofstra University, NY.

**Kara Fornstrom** is the University of Wyoming School of Energy Resources (SER) Center for Energy Regulation and Policy Analysis (CERPA) director. A center of excellence housed in SER, CERPA draws on interdisciplinary energy law, policy, technology and economic experts on and off campus to conduct world-class analyses of various regulatory issues within the energy industry -- with the goal of developing effective and pragmatic energy policies to benefit Wyoming. Fornstrom has more than 20 years of experience in the utility regulatory and administrative law sectors, and she has a proven record of generating internal and external relationships, addressing complex technical issues and managing challenging situations. She earned her bachelor's degree in small business management from UW and her law degree from the University of Nebraska-Lincoln College of Law.

**Sallie E. Greenberg** is the Principal Owner of Sallie Greenberg Consulting LLC. Prior to this, she was the Principal Research Scientist of Energy & Minerals at the Illinois State Geological Survey - University of Illinois and Strategic Advisor for Energy & Minerals. She worked on multiple projects, including Co-leading the Midwest Regional Carbon Initiative Partnership and the Illinois Corridor CarbonSAFE project. Over the last 20+ years, she led the Illinois Basin – Decatur Project to completion and has consulted or contributed to more than 30 energy and carbon capture and storage projects, especially in project development, risk reduction, and stakeholder engagement. Dr. Greenberg specializes and consults in many areas including strategic development, government relations, energy policy, environmental and social justice, project review, and relationship building. Dr. Greenberg uses her advanced degrees in low temperature geochemistry and education to create strategies for change based on understanding public challenges related to balancing societal demands for energy with environmental concerns. Dr. Greenberg holds a Ph.D. in Secondary and Continuing Education and Master of Science degree in Geology from the University of Illinois, and a Bachelor of Arts degree in Geology from Alfred University in New York.

**Sarah Jewett** is the Director of Strategy at Fervo Energy, an energy startup focused on leveraging innovation in geoscience to accelerate the clean energy transition. She joined Fervo in September 2020 after serving as Senior Director of Corporate Development at Select Energy Services. Previously, Sarah worked in field engineering roles at Schlumberger and Haliburton, working with advanced shale technologies. She also has investment experience with SCF Partners, a private equity firm focused on energy and equipment services. Sarah earned her undergraduate degree in Engineering Sciences from Dartmouth College and her graduate degree in Business Administration from Harvard Business School.

**Matthew Minnick** received his Ph.D. in Geological Engineering with a minor in Computer Science focused on machine learning from the Colorado School of Mines. Dr. Minnick works at RESPEC Inc. where he is focused on geothermal resource development, subsurface flow modeling, micro seismic, mine inflow, and brine disposal. Dr.

Minnick is leading a Machine Learning initiative at RESPEC building a team and platforms to better serve our clients. He has successfully applied ML concepts to several projects solving complex correlations and patterns. Examples include application of neural networks to predict salt purity based on geophysical logs, correlation of salt rock mineralogy and textures to geomechancial properties, reinforcement learning applied oil shale basin development, and supervised/unsupervised classification applied to temporal and spatial correlations of micro-seismic events and injection patterns.

**Zach Pendleton** is the Founder and Chief Executive Officer of FCM. Zach has spent his career in the energy industry, building and leading teams in Finance, Operations, Strategy, and Project Management. Prior to founding FCM Carbon Solutions, Zach served in numerous leadership roles within Noble Energy, ultimately serving as Head of Asset Development for Noble Energy in Colorado. In conjunction with his traditional energy background, Zach also spearheaded Noble Energy's carbon management initiatives in Colorado. The knowledge gained through his work led Zach to identify a practical need for near-term carbon emissions solutions in the industrial sector and FCM was founded to address these needs. Zach was born and raised in Denver, Colorado. He received a BBA in Finance & Accounting from the University of Colorado-Boulder and currently serves as a member of the Colorado School of Mines CCUS Task Force.

**Nick Tew** was appointed State Geologist of Alabama in October 2002 after having been at the Geological Survey of Alabama since 1984. As State Geologist, Dr. Tew also serves as State Oil & Gas Supervisor and Director of the Survey and the staff of the State Oil and Gas Board of Alabama. Nick holds BS, MS, and PhD degrees in Geology, as well as a BA in Anthropology. He has a comprehensive knowledge of Alabama's surface and subsurface geology through his over 40 years of professional geological experience. Nick serves as Alabama's Official Representative to the Interstate Oil and Gas Compact Commission (IOGCC) and is currently President of the Groundwater Protection Council. He is a professional geologist licensed by the Alabama State Board of Licensure for Professional Geologists, a Fellow of the Geological Society of America, and a 40-year member of the American Association for Petroleum Geologists. Nick was awarded the E.W. Marland Award, IOGCC's highest honor, in 2013, and the Medal in Memory of Ian Campbell for Superlative Service to the Geosciences, the highest award of the American Geosciences Institute, in 2016.

**Kimberly Wurtz** is an attorney at Phillips Murrah. Kimberly practices property law, water law, and energy law, focusing on landowner property matters, water rights, and asset protection. Prior to entering the legal field, Kimberly worked as a landman in Midland, Texas, gaining over 15 years of experience in the Permian and Delaware Basins, while focusing on land operations and management. Kimberly is a double graduate from the University of Oklahoma, receiving her bachelor's degree and her Juris Doctor from OU. While in law school, she received the American Jurisprudence Award for Energy Law and was named to the Dean's Honor Roll. Always in pursuit of learning and helping others, she now teaches Mineral Title Examination and Real Estate Transactions, and Oil and Gas Regulatory Practice at Texas A&M University School of Law. As an Oklahoma delegate to the Interstate Oil and Gas Compact Commission, she serves as the Vice Chair of the Legal and Regulatory Affairs Committee, and is a member of the Energy Resources, Research and Technology Committee. She is also currently serving on the Oklahoma NARO Board of Directors and the NARO Foundation Board of Directors and is a co-author for Patton and Palomar on Land Titles. She has published articles on groundwater, produced water and well interference and also enjoys presenting on these topics at various conferences.