TFR Curriculum Vitae for Brian McPherson, Professor

(RPT Portfolio Format)

PERSONAL INFORMATION 5A.1

1. Name

Brian McPherson

2. Degrees

Degree	Department	University	Year
Ph.D	Geophysics	University of Utah	1996
M.S.	Geophysics	University of Utah	1992
B.S.	Geophysics	University of Oklahoma	1989

3. Positions at the University of Utah

Associate Professor	Department of Civil and Environmental Engineering	2006 – 2013
Professor	Department of Civil and Environmental Engineering	2013 - present

4. Other Positions

Associate Professor of Hydrology, *2002 - 2006*, New Mexico Institute of Mining and Technology.

Senior Scientist, *2000 - 2018*, New Mexico Tech Petroleum Recovery Research Center

Assistant Professor of Hydrology, *1996 – 2001,* New Mexico Institute of Mining and Technology.

Research Hydrologist, *1996 - 2006,* Geophysical Research Center, New Mexico Institute of Mining and Technology.

Postdoctoral Fellow, 1996, The Johns Hopkins University, Baltimore, MD. Postdoctoral Advisor: Grant Garven.

Hydrologist, GRADE GS-11, 1992 – 1995, U.S. Geological Survey, Menlo Park, California.

Earned while at the University of Utah

N/A

Earned while at (name of university)

N/A

STATEMENT ON CONTRIBUTIONS TO TEACHING 5B.1

As a professor, I have taught courses in a number of fields related to water and energy resources, including surface water hydrology engineering, groundwater hydraulics, groundwater hydrology, advanced numerical modeling of hydrologic processes, carbon capture and storage science and engineering, and the science and engineering of geothermal energy.

In my classes, I aim to impart a strong understanding of the fundamental principles and concepts in these fields, as well as the practical applications and current developments. I believe that it is important for students to understand the role that water and energy play in our daily lives, and how we can manage these resources effectively and sustainably.

In my courses on surface water hydrology engineering, I cover the basics of how water moves over and through the earth's surface, and the methods used to manage and conserve this resource. I also discuss the design and operation of hydrologic systems, such as dams, reservoirs, and canals.

I teach courses on groundwater hydrology and groundwater hydraulics, and delve into the science of groundwater movement and the factors that control its flow and distribution. I also cover the methods used to measure and manage groundwater resources.

In my advanced numerical modeling class, I teach students how to use computer simulations to study and predict the behavior of water and energy systems. This is a rapidly developing field, and I strive to keep up with the latest developments and incorporate them into my teaching. My courses on carbon capture and storage science and engineering aim to educate students about the technologies and methods used to capture and store carbon emissions, as well as the challenges and opportunities associated with this field. In my classes on the science and engineering of geothermal energy, I teach students about the various technologies and techniques used to harness geothermal energy, as well as the challenges and opportunities associated with this field.

Overall, my goal as a professor is to provide students with a solid foundation in these important fields, and to foster their interest and understanding of the role that water and energy play in our world.

Course Number: Course Name

CVEEN 5920 Science and Engineering of Geothermal Energy
CVEEN 7450 Carbon Capture and Storage
CVEEN 7430 Advanced Subsurface Hydrologic Simulation
CVEEN 5920 Groundwater Hydraulics
CVEEN 5410 Engineering Hydrology

Ph.D. Students (current: 3, graduated: 11)

Name Program Expected graduation Role Funding

Name	Program	Graduation Date	Role	Funding
Felixcia Blanchard	University of Utah Civil and Environmental Engineering	Start Date: 2023	Advisor	U.S. Department of Energy
Zhidi Wu	University of Utah Civil and Environmental Engineering	Start date: 2019	Advisor	U.S. Department of Energy
Federico Salas	University of Utah Civil and Environmental Engineering	Start date: 2022	Advisor	U.S. Department of Energy
Eric Edelman	University of Utah Civil and Environmental Engineering	2022	Advisor	U.S. Department of Energy
Ting Xiao	University of Utah Civil and Environmental Engineering	2018	Advisor	U.S. Department of Energy
Nathan Moodie	University of Utah Civil and Environmental Engineering	2019	Advisor	U.S. Department of Energy
Vivek Patil	University of Utah Civil and Environmental Engineering	2016	Advisor	U.S. Department of Energy
Wei Jia	University of Utah Civil and Environmental Engineering	2016	Advisor	U.S. Department of Energy
Seong-Jun Lee	University of Utah Civil and Environmental Engineering	2013	Advisor	U.S. Department of Energy
Jason Heath	New Mexico Institute of Mining and Technology	2010	Advisor	U.S. Department of Energy
Weon Shik Han	New Mexico Institute of Mining and Technology	2008	Advisor	U.S. Department of Energy
Samuel Earman	New Mexico Institute of Mining and Technology	2004	Advisor	U.S. Department of Energy
David Boutt	New Mexico Institute of Mining and Technology	2004	Advisor	U.S. Department of Energy
Ucok Siagian	New Mexico Institute of Mining and Technology	2000	Advisor	U.S. Department of Energy

M.S. Students (current: 1, graduated: 14)

Name	Program	Graduation Date	Role	Funding
Aileen Zebrowski	University of Utah Civil and Environmental Engineering	Start: 2023	Advisor	U.S. Department of Energy
Aaron Meyer	University of Utah Civil and Environmental Engineering	2020	Advisor	U.S. Department of Energy
Alec Nelson	University of Utah Civil and Environmental Engineering	2021	Advisor	U.S. Department of Energy
Amanda Varland	University of Utah Civil and Environmental Engineering	2014	Advisor	U.S. Department of Energy
Dana Dean	University of Utah Civil and Environmental Engineering	2023	Advisor	U.S. Department of Energy
Yonas Tsegay	University of Utah Civil and Environmental Engineering	2018	Advisor	U.S. Department of Energy
Richard Lyons	University of Utah Civil and Environmental Engineering	2015	Advisor	U.S. Department of Energy
Blayde McIntire	University of Utah Civil and Environmental Engineering	2014	Advisor	U.S. Department of Energy
Lindsay Minck	University of Utah Civil and Environmental Engineering	2014	Advisor	U.S. Department of Energy
Aaron Abel	New Mexico Institute of Mining and Technology	2007	Advisor	U.S. Department of Energy
Jennifer Smith	New Mexico Institute of Mining and Technology	2004	Advisor	U.S. Department of Energy
Tristan Wellman	New Mexico Institute of Mining and Technology	2002	Advisor	U.S. Department of Energy
Jenny Cherney Sterling	New Mexico Institute of Mining and Technology	2001	Advisor	U.S. Department of Energy
Barret Cole	New Mexico Institute of Mining and Technology	2000	Advisor	U.S. Department of Energy
Erika Bowen	New Mexico Institute of Mining and Technology	1999	Advisor	U.S. Department of Energy

Undergraduate Research Advised (#)

Student name	Year(s)	Project
N/A		

Special Projects Directed (#)

N/A

Science and Engineering of Carbon Capture and Storage: Short Course for EGI Corporate Associates, September 28, 2022

STATEMENT OF CONTRIBUTIONS TO RESEARCH 5C.1

I am proud to serve as faculty in the Department of Civil and Environmental Engineering at the University of Utah. Both research and teaching are really, really fun at this stage of my career, and now my attention is very focused on building the careers of new scientists and engineers at the university.

My primary field is mathematical modeling, and perhaps the primary reason I was recruited to join the University of Utah faculty in 2006. My graduate degrees are both from the University of Utah in 1992 and 1996, including a doctoral dissertation focused on a three-dimensional model of the geologic and hydrodynamic evolution of the Uinta Basin. My current research interests include carbon sequestration, groundwater and reservoir simulation, multiphase flow analysis, rock deformation, and subsurface chemically reactive transport analysis and simulation.

Over the past five years, I took on various leadership positions and project management roles. I am the Co-Principal Investigator and Science Director of the Southwest Regional Partnership on Carbon Sequestration and the Carbon Utilization and Storage Partnership of the Western US, both programs funded by the U.S. Department of Energy to evaluate the science and technology of carbon storage through a regional, multidisciplinary, systems-based approach.

During the 25 years of my faculty career, I received a total of $146,908,361 in grant funding, with $28,891,748 in active federal funding as of 2023. Some of my ongoing projects include the Uinta Basin CarbonSAFE II: Storage Complex Feasibility, Improving Production in the Emerging Paradox Oil Play, and the SMART Machine Learning Initiative for Utah. I have also completed successful projects and grants, such as the CarbonSAFE Rocky Mountains Project, Carbon Capture at the Hunter Power Plant, and the Rocky Mountain Carbon Capture and Storage project. Emerging themes during the last five years include Uncertainty Quantification, Machine Learning and Enhanced Helium Recovery research.

My work is published in a range of peer-reviewed journals and I also published several book chapters, including "Associated Storage With Enhanced Oil Recovery: A Large-Scale Carbon Capture, Utilization, and Storage Demonstration in Farnsworth, Texas, USA". My research has covered a wide range of topics, including geologic carbon storage, CO2 capture technology, CO2 sequestration with enhanced oil recovery, well performance prediction, induced seismicity, relative permeability, risk assessment, mineral reactive surface area, subsurface CO2 impacts in general, coupled reactive transport through fault-zones, CH4 displacement by CO2, leakage pathway estimation, pressure management strategies, CO2-fluid-rock interaction, self-sealing of geological faults, tracer experiments, arsenic mobilization, high-permeability wormhole generation, CO2-cement-rock interactions, and competitive adsorption between methane and water. I will continue working towards improving our understanding of these complex systems and taking a multidisciplinary approach to finding sustainable solutions for the energy-environmental challenges we face.

Probably my greatest objective for the next five years is to advise and help build the careers of my PhD students and postdoctoral researchers. A very tangible goal is to assist each of the seven postdoctoral researcher working with me, including Ting Xiao, Eric Edelman, No'am Dvory, Kevin McCormack, Carlos Vega-Ortiz, Lei Xu, and Nathan Moodie, to secure

their own significant ($1M or greater) grant awards, and for each of them to hire and advise multiple PhD students. Such a model will, ideally, free up some of my own time to supervise more PhD students, while also increasing substantially the number of new PhD students in the CvEE program. Dr. Ting Xiao's award of a new grant of $11.7M is a great start; this is Ting's first grant proposal, and together we really "knocked it out of the park." I am hopeful that this model of new PhDs serving as PI with me (a senior faculty member) as their co-PI and a carefully-selected team will lead to a more comprehensive research program in carbon-neutral energy at the University of Utah.

Brief Summaries of Current Research Projects

Uinta Basin CarbonSAFE II: Storage Complex Feasibility
Improving Production in the Emerging Paradox Oil Play.
Concomitant Enhanced Oil Recovery and Carbon Sequestration at the Farnsworth Field, Texas: Southwest Regional Partnership on Carbon Sequestration, Phase III.
Carbon Utilization and Storage Partnership for the Western USA – Phase 1
CarbonSAFE Phase III, San Juan Basin, NM
SMART Machine Learning Initiative for Utah - Phase II

University of Utah Collaborators

Carlos Oroza, Cari Johnson, Christine Pomeroy, Lauren Birgenheier, John Lin, Milind Deo, Joe Moore, Pete Rose, Palash Panja, many others

External Collaborators

David Boutt, University of Massachusetts, Eric Sundquist, U.S. Geological Survey, Laurel Goodwin, University of Wisconsin, Robert Lee, New Mexico Tech, Robert Balch, New Mexico Tech; Peter Lichtner, Los Alamos; Fred Wang, Texas BEG; Pete McGrail, Pacific Northwest National Lab; Kevin D. Crowley, Nuclear Regulatory Commission (formerly of University of Oklahoma); John D. Bredehoeft (graduate advisor), U.S. Geological Survey; Grant Garven (postdoctoral advisor), Tufts University (formerly of Johns Hopkins University), Zhenxue Dai, Jilin University, China; William Ampomah, New Mexico Tech; Richard Middleton, Los Alamos National Laboratory; Rajesh Pawar, Los Alamos National Laboratory; many others.

Funded Research Grants (Current Grants Only)

Co-PI (with former student and new CvEE Research Assistant Professor Ting Xiao as PI), $11,752,730 (total project funding, including private sector matching funds), *Uinta Basin CarbonSAFE II: Storage Complex Feasibility,* 04/01/23 – 03/31/25, U.S. Department of Energy. Status: *Awarded and in negotiation*.

PI, Improving Production in the Emerging Paradox Oil Play, Total federal funding: $7,999,999 (total project funding including industry contribution: $10,999,999), 10/1/2019 – 3/31/2024: U.S. Department of Energy. *Status: Awarded and active*

PI and Co-PI, Concomitant Enhanced Oil Recovery and Carbon Sequestration at the Farnsworth Field, Texas: Southwest Regional Partnership on Carbon Sequestration, Phase III, University of Utah budget = $8,090,485 (October, 2012 – July, 2023): U.S. Department of Energy. *Status: Awarded and active*.

Co-PI, Carbon Utilization and Storage Partnership for the Western USA – Phase 1, Total federal funding for UU: $1,048,534, 10/1/2019 – 3/31/2022: U.S. Department of Energy. *Status: Awarded and Active*

Co-PI, CarbonSAFE Phase III, Total federal funding for UU: $908,600, 10/1/2020 – 9/30/2024: U.S. Department of Energy. *Status: Awarded and Active*

Co-PI, Carbon Utilization and Storage Partnership for the Western USA – Phase 1, Total federal funding for UU: $922,000, 04/1/2022 – 3/31/2024: U.S. Department of Energy. *Status: Awarded and active*

PI, SMART Machine Learning Initiative for Utah - Phase II, Total federal funding: $900,000, 04/1/2022 – 3/31/2025: U.S. Department of Energy. *Status: Awarded and active*

Other Competitive Grants and Awards

N/A

N/A

Proposals Awarded and Pending 2023/2024

Southwest Regional Direct Air Capture Hub (Arizona State University, Prime)
https://southwestdirectaircapture.org/
U.S. Department of Energy
Approx. $500k federal budget to UU / Brian McPherson, co-PI

Red Rocks Direct Air Capture Hub (Fervo Energy, Prime)
U.S. Department of Energy
Approx. $378k federal budget to UU / Brian McPherson, co-PI

Proposals in Review 2024

Black Mesa Basin Carbon Storage RITAP Project
U.S. Department of Energy $5M total federal budget
Carlos Vega (postdoc advisee), PI
Brian McPherson, co-PI

Uinta Basin Carbon Storage RITAP Project
U.S. Department of Energy $5M total federal budget
Ting Xiao (former student advisee), PI
Brian McPherson, co-PI

Proposals in Preparation

N/A

7. Balch, R. and **McPherson**, B., 2022. Associated Storage With Enhanced Oil Recovery: A Large-Scale Carbon Capture, Utilization, and Storage Demonstration in Farnsworth, Texas, USA. Geophysical Monitoring for Geologic Carbon Storage, pp.343-360.

6. **McPherson**, B.J., 2014, "Carbon Cycle." in Achieving Sustainability: Visions, Principles, and Practices, ed. Debra Rowe. Detroit: Macmillan Reference USA, ISBN-10: 0028662040, 1000 pp.

5. **McPherson**, Brian J., 2010, Carbon Capture and Storage, book chapter in McGraw-Hill Yearbook of Science and Technology, 2010, McGraw-Hill, New York, 496 pp.

4. **McPherson**, B., 2010, Development and application of carbon dioxide (CO_2) storage for
improving the environmental impact of advanced power plants, book chapter in Advanced Power Plant Materials, Design and Technology, D. Roddy, Editor, Woodhead Publishing, Cambridge, UK, 382 pp.

3. **McPherson**, B.J., 2009, The Science and Technology of Geologic Carbon Sequestration:
Future Research Needs, Final Chapter in Carbon Sequestration and Its Role in the Global Carbon Cycle. B. **McPherson**, and E. Sundquist, Eds., Geophysical Monograph Series, Volume 183, American Geophysical Union, Washington, D.C., doi:10.1029/2009gm01308.

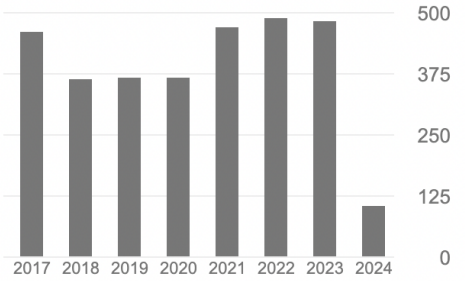
2. *Han, W. S., **McPherson**, B.J., 2009, On using numerical simulation to evaluate CO2 flow and transport in the subsurface: Uncertainty due to choice of Equations of State algorithms, Chapter in Carbon Sequestration and Its Role in the Global Carbon Cycle. B. **McPherson**, and E. Sundquist, Eds., Geophysical Monograph Series, Volume 183, American Geophysical Union, Washington, D.C., doi:10.1029/2009gm01308.

1. **McPherson**, B. J. O. L. and Sundquist, E. T., **2009**, editors, Carbon Sequestration and its Role in the Global Carbon Cycle, AGU Monograph Series, Publisher: American Geophysical Union, Washington, D.C., doi:10.1029/2009gm01308.

85 publications at University of Utah

20 publications prior to University of Utah

	All	Since 2019
Citations	4938	2280
h-index	38	27
i10-index	92	66



105. Xiao, Ting, Chen, Ting, Ma, Zhiwei, Tian, Hailong, Meguerdijian, Saro, Chen, Bailian, Pawar, Rajesh, Huang, Lianjie, Xu, Tianfu, Cather, Martha, and **McPherson, Brian** (2024). A review of risk and uncertainty assessment for geologic carbon storage. Renewable and Sustainable Energy Reviews, 189, 113945. https://doi.org/10.1016/j.rser.2022.113945

104. Thanh, Hung Vo, Dai, Zhenxue, Du, Zhengyang, Yin, Huichao, Yan, Bicheng, Soltanian, Mohamad Reza, Xiao, Ting, **McPherson, Brian**, Abualigah, Laith. (2024). Artificial intelligence-based prediction of hydrogen adsorption in various kerogen types: Implications for underground hydrogen storage and cleaner production. International Journal of Hydrogen Energy, 57, 1000-1009. https://doi.org/10.1016/j.ijhydene.2021.11.132

103. *Wu, Zhidi, Edelman, Eric, Smith, Phil, Smith, Sean, Irons, Trevor, **McPherson, Brian**. (2024). Framework for Bayesian assessment of factors that impact rock mechanical response. Rock Mechanics and Rock Engineering, 1-21. https://doi.org/10.1007/s00603-023-2356-1

102. Xiao, Ting, Tu, Jiawei, Wang, Bonan, Esser, Richard, Bailey, Tessa, Cather, Martha, Tian, Hailong, **McPherson, Brian**. (2023). Chemical impacts of subsurface CO2 and brine on shallow groundwater quality. Chemosphere, 321, 138048. https://doi.org/10.1016/j.chemosphere.2020.138048

101. *McCormack, Kevin L., McLennan, John D., Jagniecki, Elliot A., **McPherson, Brian J.** (2023). Discrete measurements of the least horizontal principal stress from core data: An application of viscoelastic stress relaxation. SPE Reservoir Evaluation & Engineering, 1-15. https://doi.org/10.2118/202726-PA

100. Liu, Xuejian, Huang, Lianjie, Gao, Kai, Bratton, Tom, El-Kaseeh, George, Ampomah, William, Will, Robert, Czoski, Paige, Cather, Martha, Balch, Robert, and **McPherson, Brian** (2023). Seismic monitoring at the Farnsworth CO2-EOR field using time-lapse elastic-waveform inversion of 3D-3C VSP data. Energies, 16(9), 3939. https://doi.org/10.3390/en16093939

99. Qin, Yan, Li, Jiaxuan, Huang, Lianjie, Gao, Kai, Li, David, Chen, Ting, Bratton, Tom, El-kaseeh, George, Ampomah, William, Ispirescu, Titus, Martha Cather, Robert Balch, Yingcai Zheng, Shuhang Tang, Kevin L McCormack, and **Brian McPherson** (2023). Microseismic monitoring at the Farnsworth CO2-EOR field. Energies, 16(10), 4177. https://doi.org/10.3390/en16104177

98. Lee, Si-Yong, Mohamed, Farid Reza, Lee, Kwang-Ho, **McPherson, Brian**, Balch, Robert, Yoon, Sangcheol. (2023). Probabilistic evaluation of geomechanical risks in CO2 storage: An exploration of caprock integrity metrics using a multilaminate model. Energies, 16(19), 6954. https://doi.org/10.3390/en16196954

*97. Moodie, N., Jia, W., Middleton, R., Yaw, S., Lee, S.Y., Xiao, T., Wheatley, D., Steele, P., Esser, R. and **McPherson**, B., 2022. Geologic Carbon Storage of Anthropogenic CO2 under the Colorado Plateau in Emery County, Utah. Minerals, 12(4), p.398.

96. Panja, P., **McPherson**, B. and Deo, M., 2022. Techno-economic analysis of amine-based CO2 capture technology: hunter plant case study. Carbon Capture Science & Technology, 3, p.100041.

95. Ampomah, W., **McPherson**, B., Balch, R., Grigg, R. and Cather, M., 2022. Forecasting CO2 Sequestration with Enhanced Oil Recovery. Energies, 15(16), p.5930.

94. Panja, P., Jia, W. and **McPherson**, B., 2022. Prediction of well performance in SACROC field using stacked Long Short-Term Memory (LSTM) network. Expert Systems with Applications, 205, p.117670.

93. McCormack, K.L., Bratton, T.R., Chen, T. and **McPherson**, B.J., 2022. Induced seismicity potential based on probabilistic geomechanics for the San Juan Basin CarbonSAFE project. Geophysics, 87(6), pp.EN69-EN79.

*92. Xiao, T., Wang, B., Xu, L., Esser, R., Dai, Z., Cather, M. and **McPherson**, B., 2022. Underground sources of drinking water chemistry changes in response to potential CO2 leakage. Science of The Total Environment, 847, p.157254.

*91. Moodie, Nathan; Ampomah, William; Heath, Jason; Jia, Wei; **McPherson**, Brian (July, 2021) Quantitative analysis of the influence of capillary pressure on geologic carbon storage forecasts case study: CO_2-EOR in the Anadarko basin, TexasInternational Journal of Greenhouse Gas Control, Volume 109, July 2021, 103373 (11 pp.), https://doi.org/10.1016/j.ijggc.2021.103373.

90. Bao, Ting; Burghardt, Jeff; Gupta, Varun; Edelman, Eric; **McPherson**, Brian; White, Mark (October, 2021) Experimental workflow to estimate model parameters for evaluating long term viscoelastic response of CO_2 storage caprocks, International Journal of Rock Mechanics and Mining Sciences, Volume 146, https://doi.org/10.1016/j.ijrmms.2021.104796.

*89. Moodie, Nathan; Ampomah, William; Jia, Wei; **McPherson**, Brian (April, 2021) Relative Permeability: A Critical Parameter in Numerical Simulations of Multiphase Flow in Porous Media, Energies 2021, 14(9), 2370-2384; https://doi.org/10.3390/en14092370

88. Lee, Si-Yong; Hnottavange-Telleen, Ken; Jia, Wei; Xiao, Ting; Viswanathan, Hari; Chu, Shaoping; Dai, Zhenxue; Pan, Feng; **McPherson**, Brian; Balch, Robert (March, 2021) Risk Assessment and Management Workflow—An Example of the Southwest Regional Partnership, Energies 2021, 14(7), 1908-1926; https://doi.org/10.3390/en14071908

*87. Jia, Wei; Xiao, Ting; Wu, Zhidi; Dai, Zhenxue; **McPherson**, Brian (March, 2021) Impact

of Mineral Reactive Surface Area on Forecasting Geological Carbon Sequestration in a CO2-EOR Field, Energies 2021, 14(6), 1608-1630; https://doi.org/10.3390/en14061608.

*86. Xiao, Ting; Jia, Wei; Esser, Richard; Dai, Zhenxue; **McPherson**, Brian (March, 2021) Potential Chemical Impacts of Subsurface CO2: An Integrated Experimental and Numerical Assessment for a Case Study of the Ogallala Aquifer, Water Resources Research, Vol. 57, http://dx.doi.org/10.1029/2020WR029274.

*85. Patil, V. and **McPherson**, B. (March, 2021). Modeling Coupled Reactive Transport Through Fault-zones: A Critical Review. Environmental Engineering Science. Vol. 10, 44-88. https://doi.org/10.1089/ees.2020.0413.

84. Dai, Zhenxue & Xu, L., Xiao, T., **McPherson**, B., Zhang, X., Zheng, L., Dong, S., Yang, Z., Soltanian, M. R., Yang, C., Ampomah, W., Jia, W., Yin, S., Xu, T., Bacon, D., Viswanathan, H., (September, 2020). Reactive chemical transport simulations of geologic carbon sequestration: Methods and applications. Earth-Science Reviews. Vol. 208, 103265-103280. https://doi.org/10.1016/j.earscirev.2020.103265

*83. Xiao, T. & Xu, H., Moodie, N., Esser, R., Jia, W., Zheng, L., Rutqvist, J., **McPherson**, B. (September, 2020). Chemical-mechanical impacts of CO2 intrusion into heterogeneous caprock. Water Resources Research. Vol. 56, http://dx.doi.org/10.1029/2020WR027193.

*82. Xiao, T. & **McPherson**, B., Esser, R., Dai, Z., Chu, S., Pan, F., Jia, W., Viswanathan, H. (December, 2020). Chemical impacts of potential CO2 and brine leakage on groundwater quality with quantitative risk assessment: A case study on the Farnsworth Unit. Energies. Vol. 13: 6574-6588 https://doi.org/10.3390/en13246574

*81. Patil, V. & **McPherson**, B. (March, 2020). Identifying Hydrogeochemical Conditions for Fault Self-Sealing in Geological Storage. Water Resources Research. Vol. 56, https://doi.org/10.1029/2018WR024436.

*80. Moodie, Nathan; Ampomah, William; Jia, Wei; Heath, Jason; **McPherson**, Brian; (2019) Assignment and calibration of relative permeability by hydrostratigraphic units for multiphase flow analysis, case study: CO2-EOR operations at the Farnsworth Unit, TexasInternational Journal of Greenhouse Gas Control 81 103-114

*79. Xiao, Ting; **McPherson**, Brian; Esser, Richard; Jia, Wei; Moodie, Nathan; Chu, Shaoping; Lee, Si-Yong; Forecasting commercial-scale CO2 storage capacity in deep saline reservoirs: Case study of Buzzard's bench, Central Utah Computers & geosciences 126: 41-51, 2019

78.Tavakol-Davani, Hessam E; Tavakol-Davani, Hassan; Burian, Steven J; **McPherson**, Brian J; Barber, Michael E; Green infrastructure optimization to achieve pre-development conditions of a semiarid urban catchment Environmental Science: Water Research & Technology 5(6): 1157-1171, 2019

77. Lei, Gang; Cao, Nai; **McPherson**, Brian J; Liao, Qinzhuo; Chen, Weiqing; A novel Analytical Model for pore Volume compressibility of fractal porous Media

Scientific reports 9, 2019

76. Tavakol-Davani, Hassan; Rahimi, Reyhaneh; Burian, Steven J; Pomeroy, Christine A; **McPherson**, Brian J; Apul, Defne; Combining Hydrologic Analysis and Life Cycle Assessment Approaches to Evaluate Sustainability of Water Infrastructure: Uncertainty Analysis,Water11(12): 2592 2019

75. Jia, Wei; **McPherson**, Brian; Pan, Feng; Dai, Zhenxue; Moodie, Nathan; Xiao, Ting; Impact of Three‐Phase Relative Permeability and Hysteresis Models on Forecasts of Storage Associated With CO2‐EOR Water Resources Research 54(2):1109-1126 2018

74. Irons, Trevor P; **McPherson**, Brian JOL; Kass, M Andrew; Reliable noise measure in time-gated NMR data Geophysical Journal International 215 2 959-964 2018

73. Lu, Chuan; **McPherson**, Brian; Wang, GuiLing; Hysteresis effects in geological CO2 sequestration processes: a case study on Aneth demonstration site, Utah, USA. Journal of Groundwater Science and Engineering 6 4 243-260 2018

*72. Quanshu Zeng, Zhiming Wang, Liangqian Liu, Jianping Ye, Brian J. **McPherson**, and John D. McLennan 2018, Modeling CH_4 displacement by co2 in deformed coalbeds during enhanced coalbed methane recovery, Energy & Fuels 32, no. 2, 1942–1955.

*71. Lee, S.J. & **McPherson**, B.J., 2018, Application of an inverse simulator of single-phase flow analysis for leakage pathway estimation in a multiphase system for geologic CO_2 storage, Transp Porous Med, 121: 507. https://doi.org/10.1007/s11242-017-0961-6.

*70. Wei Jia, Brian **McPherson**, Feng Pan, Zhenxue Dai, and Ting Xiao, 2018, Uncertainty quantification of CO_2 storage using Bayesian model averaging and polynomial chaos expansion, International Journal of Greenhouse Gas Control 71, 104 – 115

*69. Wei Jia, Brian **McPherson**, Zhenxue Dai, Trevor Irons, and Ting Xiao , 2017, Evaluation of pressure management strategies and impact of simplifications for a post-EOR CO_2 storage project, Geomechanics and Geophysics for Geo-Energy and Geo-Resources 3, no. 3, 281–292.

*68. Wei Jia, Feng Pan, Zhenxue Dai, Ting Xiao, and Brian **McPherson** , 2017, Probabilistic Risk Assessment of CO_2 trapping mechanisms in a sandstone CO_2-EOR Field in Northern Texas, USA, Energy Procedia 114, 4321–4329.

*67. Nathan Moodie, Feng Pan, Wei Jia, and Brian **McPherson** , 2017, Impacts of relative permeability formulation on forecasts of CO_2 phase behavior, phase distribution, and trapping mechanisms in a geologic carbon storage reservoir, Greenhouse Gases: Science and Technology 7, no. 2, 241–258.

*66. Feng Pan, Brian J. **McPherson**, and John Kaszuba , 2017, Evaluation of CO_2-Fluid-Rock Interaction in Enhanced Geothermal Systems: Field-Scale Geochemical Simulations, Geofluids, vol. 2017, Article ID 5675370, doi:10.1155/2017/5675370.

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N/A

DISCLOSURES, PATENTS ISSUED, AND SOFTWARE DISTRIBUTED 5D.7

N/A

MAJOR MEDIA EXPOSURE 5D.8

- 2016 First Bell web announcement of U.S. Department of Energy Grant award to McPherson. 12/2016 - http://mailview.bulletinmedia.com/mailview.aspx?m=2016120201asee&r=2881281-f8fd
- 2016 Department of Energy Press Release: announcement of U.S. Department of Energy Grant award to McPherson - https://energy.gov/under-secretary-science-and-energy/articles/energy-department-announces-more-44-million-co2-storage
- 2016 Newspaper Article on KSL.com: http://www.ksl.com/?nid=148&sid=42417678
- 2016 Radio Interview on "This Green Earth," KCPW, with Nell Larson and Chris Cherniak (6 December 2016); URL: http://kpcw.org/post/green-earth-december-6-2016#stream/0
- 2013 - KUER Interview with Dan Bammes, about recent EPA policy changes. 09/24/2013 URL: http://kuer.org/post/new-epa-rules-boost-cost-power-coal
- 2011 - Interviewed about Carbon Capture and Storage Research, "Business Leaders Call for More Funding for Science and Technology" by Andrea Smardon of KUER Public Radio, aired during local NPR broadcast on December 27, 2011 (transcript of story at http://www.publicbroadcasting.net/kuer/news.newsmain?action=article&ARTICLE_ID=1888518)
- 2010 - Interviewed by Rod Decker, Wednesday August 4th, for Decker's TV show, "Take Two" (broadcast in September, 2010)
- 2010 - AP wire story and Salt Lake Tribune: "U. professor gets $5 million DOE grant to study CO2 storage," http://www.sltrib.com/sltrib/money/50260100-79/carbon-storage-doe-million.html.csp
- 2010 - CNBC: "Univ. of Utah wins grant for carbon capture"
- 2010 - Ogden Standard Examiner - U of U to study capture of CO2 emissions
- 2008 - Discovery Channel Documentary - "Hot Planet" - McPherson interviewed about climate change and carbon storage. Aired on Discovery Channel 12/08/2008
- 2008 - Salt Lake Tribune - "Coal industry's message reaches campaigns" - article describes McPherson research. 10/26/2008
- 2008 - Op-Ed piece in SL Tribune, entitled "Don't limit tools to fight rising CO2 by excluding carbon capture" authored by McPherson. SL Tribune Article ID: 9722753 06/27/2008
- 2008 - SL Tribune Article "New teams, new faculty" outlines McPherson research with USTAR. SL Tribune Article ID: 8661778. 03/22/2008
- 2008 - SL Tribune article "USTAR: Utah bets on science dollars" - outlines McPherson research with USTAR support. SL Tribune Article ID: 8658963. 03/22/2008
- 2007 - KCPW - Radio Interview (2007)
- 2007 - Salt Lake Tribune - Summary article about USTAR (2007)

- 2007 - Deseret News - Summary article about USTAR (2007)
- 2007 - Salt Lake Tribune, US - Putting a lid on global warming: http://www.sltrib.com//ci_7478872?IADID=Search-www.sltrib.com-www.sltrib.com (printed November 16, 2007)
- 2007 - Salt Lake Tribune, US - Project plans to bury CO2: http://www.sltrib.com//ci_7488186?IADID=Search-www.sltrib.com-www.sltrib.com (printed November 20, 2007)
- 2007 - Daily Utah Chronicle, UT - Governor praises carbon sequestration research: http://media.www.dailyutahchronicle.com/media/storage/paper244/news/2007/11/21/News/Governor.Praises.Carbon.Sequestration.Research-3113165.shtml (printed November 21, 2007)
- 2007 - Daily Utah Chronicle – 'U hires researchers under USTAR initiative' http://media.www.dailyutahchronicle.com/media/storage/paper244/news/2007/02/07/News/U.Hires.Researchers.Under.Ustar.Initiative-2702033.shtml?sourcedomain=www.dailyutahchronicle.com&MIIHost=media.collegepublisher.com&mkey=1921427 (printed February 7, 2007)
- 2007 - Interviewed by KSL TV about Carbon Research – http://www.ksl.com/?nid=148&sid=855804 (aired on February 2, 2007)
- 2007 - Interviewed by Deseret Morning News about Carbon Research: http://deseretnews.com/dn/print/1,1442,655191737,00.html, and http://www.sltrib.com/search/ci_5105042 (printed on January 29, 2007)
- 2005 - Interviewed by Wall Street Journal about Carbon Research

Xiao, Ting; Jia, Wei; Esser, Richard; Dai, Zhenxue; **McPherson**, Brian (March, 2021) Potential Chemical Impacts of Subsurface CO2: An Integrated Experimental and Numerical Assessment for a Case Study of the Ogallala Aquifer, Water Resources Research, Vol. 57, http://dx.doi.org/10.1029/2020WR029274.

STATEMENT ON CONTRIBUTIONS TO SERVICE 5E.1

Probably my most significant contribution to service in the past five years is that for the Justice, Equity, Diversity and Inclusion Committee in CvEE. I did not realize the profound nature of the EDI challenges we face as a department and a community. As the Chair of the Justice, Equity, Diversity and Inclusion Committee within the Department of Civil and Environmental Engineering at the University of Utah, I am really impressed by the other members on the committee and their goal to drive positive change. In this role, I have the privilege and responsibility of coordinating this group of dedicated individuals who are committed to promoting justice, equity, diversity, and inclusiveness within our department and beyond. Through our collective efforts, we have the opportunity to create a more inclusive and equitable learning environment, where all members of our community feel valued and respected. This is not just a goal, but a responsibility that I take very seriously. By offering our time, skills, and resources, we have the ability to make a meaningful impact on the lives of those around us and build a more just and equitable world. I am honored to serve as Chair of this committee and am eager to work with my colleagues to make a positive difference.

DEPARTMENT, COLLEGE, AND UNIVERSITY SERVICE 5E.2

Departmental Committee Service

Justice, Equity, Diversity and Inclusion Committee
Search Committee(s) for Water Resources

Miscellaneous Departmental Service

Informal Mentoring Efforts, including organization of a bi-weekly "Writer's Session" to encourage the younger faculty to publish their work.

College Committee Service

N/A

University Committee Service

N/A

PROFESSIONAL EXTERNAL SERVICE 5E.3

Membership in Professional Societies

1. American Geophysical Union 1989 - present
2. Geological Society of America 1990 - present

Reviewer for Academic Journals (too many to list; only two listed, for brevity)

Journal	Number of Reviews	Impact Factor as of year
1. Nature	5	69.5
2. Science	2	63.8
3.		

Editor for Academic Journals

1. Associate Editor Hydrogeology Journal, 2012 - 2014

Reviewer for Proposal Panels

1. N/A

Conference Committees

1. N/A

Conference Symposia Organization

Since coming to Utah

1. American Geophysical Union National Meeting: 2007, 2010, 2011, 2016, 2021, 2023

Before coming to Utah

1. American Geophysical Union National Meeting: 2003, 2005

OUTREACH ACTIVITIES 5E.4

N/A

MENTORING OF FACULTY AND STUDENTS (OTHER THAN ADVISEES) 5E.5

M.E. / non-thesis Masters Students (current: #, graduated: #)

Name	Program	Expected graduation	Role	Funding

N/A

Mentor/Consultant for Students on Course Projects

Name	Course (Instructor)	Project Description	Term

N/A

IMPACT OF CONSULTING (IN CANDIDATE'S AREA OF EXPERTISE) 5E.6

N/A