EVALUATING THE FINANCIAL IMPLICATIONS OF INJECTIVITY RISK IN COMPARTMENTALIZED RESERVOIRS FOR CCS

Christopher Deranian

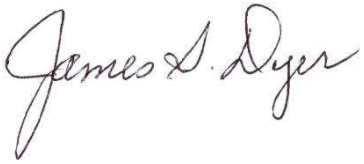
ABSTRACT

Injectivity is a major driver of risk in CCS projects. Risk mitigation efforts are focused on leakage and well remediation, while operational issues from past CCS projects have shown injectivity is frequently caused by the mischaracterization of compartmentalized reservoirs. Sub-seismic faults, misinterpreted facies changes and a host of other factors can induce unexpected compartmentalization. The financial penalty due to the disruption of CCS operations is large, depending on the agreement between the site operator and capture source. This paper explores the effect of compartment size and boundary condition on injectivity and the subsequent financial implications.

Risk profiles of injectivity are generated through reservoir simulation in CMG-GEM, constrained by preliminary statistics from a CCS prospect on the Gulf Coast. A financial tool is built to understand the impact on project value when an injectivity occurs and an offset well needs to be drilled. CO_2 offtake price and insurance mechanisms are also considered. We observe that even in relatively closed boundary conditions, pressure can dissipate in the reservoir to allow injection over the project life. To date there is no CCS literature on financial risk specifically regarding injectivity. Making CCS projects bankable requires robust assurance, and thus understanding injectivity risk, project contingency, and the feasibility of mitigation options can help to expand CCS deployment.

I'm immensely grateful to Dr. Bakhshian, Dr. Dyer, and Dr. Olmstead for their insight and support throughout this entire year. I'd also like to thank everyone at the Gulf Coast Carbon Center for their guidance. Thank you to everyone on the LBJ CCS Economics project for their own thoughtful analysis of an unexplored area in environmental policy.

Sahar Bakhshian



James Dyer