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Assessing the Potential of Abandoned and Orphaned Wells to Serve as CO2 Injectors in Pennsylvania

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ABSTRACT

Abandoned and orphaned wells present a unique opportunity to serve as sinks for CO2 that can be sequestered from atmosphere and or nearby powerplants. Abandoned wells when left unplugged holds the possibility of methane leakage into ground water. Rather than becoming environmental hazards, these wells can be repurposed to become CO2 injectors. Re-utilization can significantly lessen the surface footprint, drilling and fracking need for new wells aimed at CO2 sequestration.

Injecting CO2 into geologic formations allows the CO2 to swell and mobilize oil/natural gas to aid in enhanced oil or gas recovery. In this study, a potential well location in Pennsylvania is evaluated in terms of location, geologic properties, reservoir properties, gas deliverability, and economic analysis using numerical reservoir simulation. This study can serve as an example of how potential wells could be screened in future for similar purposes.

OBJECTIVES AND PROCEDURE

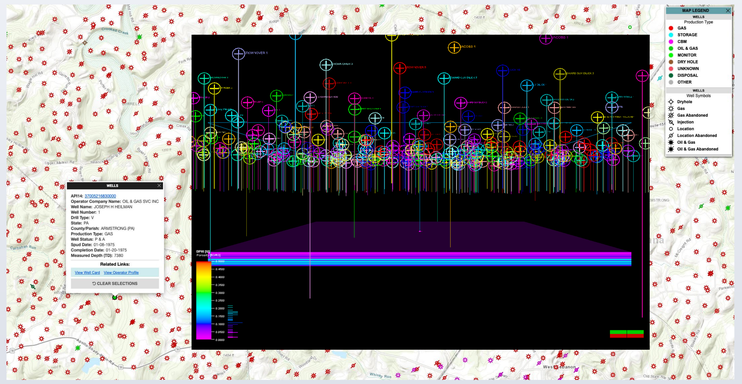
- Investigating one abandoned well in proximity to an industrial CO2 source and determine a recommended operation plan for injecting CO2 at that well site by economic and geographic benefits
- Construct a simple geomodel of the well reflecting acquired data

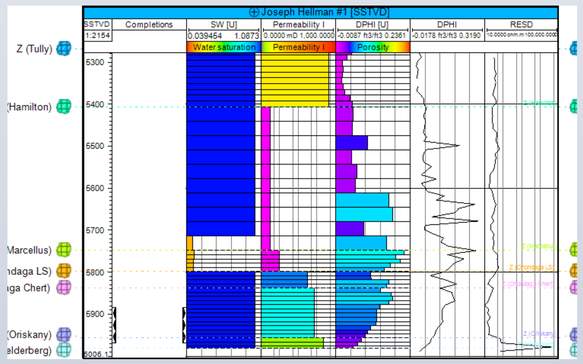
Prior to evaluating any well site, it was crucial to confirm that the well had at least a geophysical log and completion report on hand. For this project, Joseph Hellman #1 (Well 37-005-21683) was chosen because of that documentation's availability as well as wireline log data. Its location is also only 5.93 miles away from Armstrong Power LLC, a natural gas power plant, which emitted 464,170 metric tons Co2e in 2019.

The data pulled was used to construct an ensemble of models in Petrel and Eclipse and simulate CO2 flow.

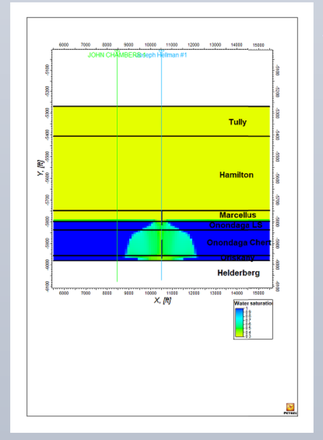
METHODS

Well identified - well logs digitized - created a geomodel - use numerical reservoir simulation-evaluate the potential for CO2 injection





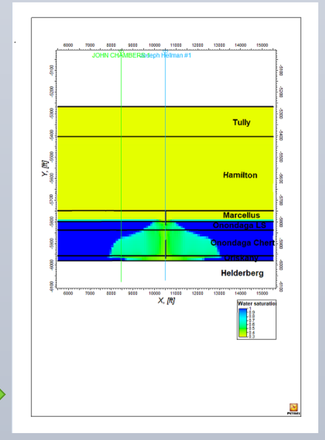
RESULTS



10,000 MSCF/day for 10 years

plumes of CO2 injection

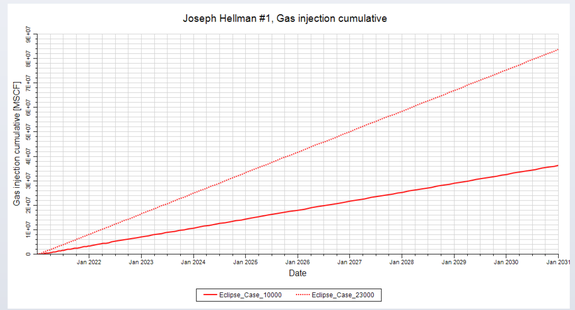
23,000 MSCF/day for 10 years



Under IRC section 45Q, the Joseph Hellman #1 well would qualify for $31.77 in tax credit per metric ton of CO2 if at least 500,000 metric tons are captured in a year.

CONCLUSION

Well injecting 10,000 MSCF/day could capture equivalent CO2 emissions from 50,000 cars on an average. A single well has such huge potential, using all the abandoned wells in this area has a huge potential to CO2 sequestration.



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If you would like to reach out to me regarding questions or interests, please contact me via email: tbs5454@psu.edu