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Marquis Carbon Injection

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Comment submitted by Lindsey Gulden

Submitter Information

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General Comment

To the U.S. Environmental Protection Agency:
Please find attached a list of detailed concerns and questions regarding the Marquis CCS site in Putnam County Illinois, for which a draft permit has been issued.

I am a former oil and gas industry research scientist who now studies carbon capture and storage (CCS). After reviewing the documents released by the EPA concerning the Marquis CCS draft permit and several related documents, I have compiled the attached list of questions for the Agency. The concerns and questions detailed in the attached document can be grouped into six main categories, which I summarize here.

1. The permitting documents barely address risks posed by the adjacent waste-pickle-liquor disposal site. The proposed Marquis CCS injection well is located slightly down-dip from the Hennepin Works waste-pickle-liquor (WPL) injection well and is well within the WPL site's area of review (AOR). All else being equal, the denser-than-brine WPL plume moves down-dip (toward the Marquis AOR), while supercritical CO₂, being buoyant in brine, migrates up-dip (into the Hennepin Works AOR). The injection zone for both sites, the Mt. Simon Sandstone, is described as containing both braided fluvial sandstones and sandstones deposited in tidal environments. These are environments of deposition through which it is notoriously difficult to predict fluid flow and, especially in the case of braided fluvial sandstones, through which streaks of high permeability rock are expected and common. Neither the Marquis injection wells nor the Hennepin Works well(s) have been confirmed to withstand exposure to both WPL and CO₂-saturated brine. Positioning of monitoring wells leaves unobserved potential incursion of the waste-pickle-liquor plume. WPL plumes in brine cannot be indirectly observed.
2. There are no proposed injection-zone monitoring wells between the WPL well and proposed Class VI injection well. Without adequate, direct observation of the WPL plume, impending interactions between the CO₂ plume and WPL plume could remain undetected until after damage to public resources is done.
3. CO₂ injection at Marquis CCS will significantly increase pressure in the Mt. Simon formation, which

reintroduces the risk of WPL contamination of groundwater. Reintroducing a pressure gradient near the WPL Class I well reintroduces the risk of contaminating groundwater—a significant concern that prior EPA documentation regarding Hennepin Works site had sought to mitigate. This risk has not disappeared. A monitoring plan is needed to protect groundwater from the pressure-driven incursion of the WPL plume into overlying groundwater resources.

4. A shortened monitoring period shifts long-term risk to the public. The draft permit reduces post-injection monitoring and financial responsibility from the standard 50 years to just 12 years. This effectively transfers long-term liability to the public, bypassing established safeguards for public safety and leaving taxpayers responsible for potential future failures. Shortening the standard monitoring period directly transfers public monies to private individuals and does not appear to be warranted by the facts presented.

5. Geologic complexity of the Mt. Simon amplifies uncertainty in fluid flow predictions, which cannot be mitigated even with state-of-the-art multiphase fluid flow simulations. The Mt. Simon Sandstone is highly heterogeneous across multiple spatial scales. This complexity makes fluid migration very difficult to accurately predict, especially in the case of multiphase fluid flow. The treatment of uncertainty in the reservoir modeling and simulation has been insufficient to properly account for the substantial uncertainty in flow patterns stemming from the inherently variable flow properties within the Mt. Simon.

6. Throughout the permit, thresholds for action are not clearly and mathematically defined, which gives too much discretionary latitude to the operator at the expense of the public interest. For example, the term ‘statistically significant’ is not defined in most (if not all) cases in the draft permit. To have enforceable meaning, the term ‘statistical significance’ must be accompanied by a clearly stated/defined statistical test to be used, the significance level to be accepted, the hypothesis being tested, and a rigorous explanation of the data basis and how uncertainty is quantified.

Please see detailed questions in the attached document. I urge EPA to address these issues before finalizing the permit and to ensure that monitoring, modeling, and post-injection oversight meet the highest standards of scientific and public accountability. Thank you for your consideration of my comments, and thank you for your protection of public safety and the public interest.

Lindsey Gulden, Ph.D.

Attachments

epa_public_comment_gulden_overview_and_detailed_questions

2015 March IEPA draft permit corrective action closure