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Original Research Article

Mapping existing wellbore locations to compare technical risks between onshore and offshore CCS activities in Texas

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Abstract

Carbon dioxide capture and geologic storage (CCS; geologic sequestration) is a promising technology for reducing anthropogenic greenhouse gas emissions to the atmosphere from industrial point sources. Aspects of CCS have been investigated for over two decades, and many large- and small-scale geologic storage field demonstration projects are now underway globally. Interest in offshore CCS has been increasing in recent years (e.g., European Union, Australia, Japan, and the United States). Deep geologic storage in offshore settings is analogous to onshore CCS activities in many respects (i.e., geologic and geotechnical aspects), but is distinct from previously explored seabed sediment CO_2 storage) or deep marine dissolution). Given the large subsurface geologic storage volumes available in offshore settings, much discussion of offshore CCS is focused on the benefits and risks of such activity compared to onshore settings. Similar to onshore settings, existing (legacy) wells likely present the most direct migration pathway and largest risk of noncontainment in offshore settings. As part of current studies to evaluate geologic storage options in offshore settings along the Texas coast and greater Gulf of Mexico (GoM), mapping of the geographic distribution and ages of wells in a region containing coastal counties and extending 30 miles offshore Texas indicates that both well spatial density and well age decrease moving from onshore to offshore. Results suggest reduced risk of leakage owing to more rigorous and documented well completion and abandonment practices for these generally younger wells (although many are decades old). A result of decreased well density is that larger areas are available for leasing for CCS projects that avoid legacy wells altogether (> 1 mile from any existing well). The one-mile designation is used as an arbitrary convention, and while it is recognized that this is smaller than a typical area of review (AoR) for permitting, each site will have a different AoR radius for consideration. The combination of large subsurface storage volumes under control of a single landowner and reduced risks from legacy wells makes offshore CCS attractive in the GoM. © 2023 Society of Chemical Industry and John Wiley & Sons, Ltd.

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