Contribution ID: **47** Type: **Oral Presentation**

Prediction of CO2 Injectivity into Low-temperature Water Zones below Natural Gas Hydrate Reservoirs for Non-Leaking Storage

Thursday, 16 May 2024 09:35 (15 minutes)

Abstract

The potential leakage of carbon dioxide (CO2) from traditional underground carbon storage reservoirs has become a growing concern. This study suggests a novel approach —injecting CO2 into subsea water zones situated under natural gas hydrate reservoirs. The objective is to store CO2 within the water zones in hydrate form, thereby minimizing the risk of future CO2 leaks. Assuming a sufficiently rapid flow of CO2 during injection to prevent hydrate formation, an analytical model was developed to predict well's CO2 injectivity. The case study utilizing data from the natural gas hydrate reservoir in the Shenhu area, Northern South China Sea, indicates that the CO2 injectivity of a water zone underlying a natural gas hydrate reservoir is significantly influenced by the transmissibility of the water zone. With water zone transmissibility values varying within a range of -50% to +50% around the mean value of 15.79 Darcy-cm, well injectivity is projected to be nearly proportional to water zone transmissibility, ranging from 6 tons/day to 16 tons/day. Interestingly, CO2 injectivity in the water zone exhibits minimal sensitivity to the permeability of the natural gas hydrate reservoir. In the examined case, the anticipated CO2 injection rate is expected to vary only slightly, ranging from 10.5 tons/day to 11.5 tons/day, even with a permeability uncertainty of the gas hydrate reservoir ranging from 1 md to 3 md. The injectivity of a well completed in the water zone aligns with that of a well completed with frac-packing in the natural gas hydrate reservoir. Both types of wells are anticipated to inject CO2 at a flow rate ranging from 6 tons/day to 16~17 tons/day, contingent upon the transmissibility of the water zone and the transmissibility of the hydraulic fracture. Notably, injecting CO2 into water zones, as opposed to frac-packed natural gas hydrate reservoirs, offers the advantage of cost savings by eliminating the need for hydraulic fracturing.

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

I would like to submit this presentation into the InterPore Journal Student Paper Award.

Country

United States

Porous Media & Biology Focused Abstracts

References

Primary author: GUO, Boyun (University of Louisiana at Lafayette)

Co-authors: Dr ZHANG, Peng; MAHMOOD, MD NAHIN (Graduate Student)

Presenter: GUO, Boyun (University of Louisiana at Lafayette)

Session Classification: MS12

Track Classification: (MS12) Advances in computational and experimental poromechanics