Preliminary Studies of Gas Production From Methane Hydrates in the Eileen Area, Alaska

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The objective of this study is the analysis of various gas production scenarios from a permafrost-related methane hydrate accumulation at the Eileen Area, North Slope Alaska. The TOUGH2 general-purpose simulator with the EOSHYDR2 module were used for the analysis. EOSHYDR2 is designed to model the non-isothermal CH_4 (methane) release, phase behavior and flow under conditions typical of methane-hydrate deposits by solving the coupled equations of mass and heat balance, and can describe any combination of gas hydrate dissociation mechanisms. Numerical simulations indicated that significant gas hydrate production at the Eileen area was possible by depressurizing the free-gas zone at the base of the hydrate stability field. In this depressurization scenario, the wettability characteristics of the porous medium had a pronounced effect on recovery, the water mass fraction in production stream was very small, and the contribution of the methane from hydrate dissociation to the production stream was very significant. When the hydrate was thermally dissociated, the volume of produced gas was significantly smaller than that produced through depressurization. In this case, gas production was affected significantly by the initial hydrate saturation and temperature, and by the method of heat addition. The largest methane recovery was achieved through a combination of depressurization and thermal stimulation. This production scenario increased the methane volume released from hydrates by about an order of magnitude compared to simple depressurization.