A trial of monitoring of the methane hydrate-production test by sonic well logging data

Takao Inamori[1]; Tetsuya Fujii[1]; Tokujiro Takayama[1]; Tatsuo Saeki[1]; Koji Yamamoto[1]

[1] JOGMEC

The Research Consortium for Methane Hydrate Resources in Japan (MH21) conducted an onshore methane hydrate production test at Mackenzie Delta, Canada, in 2007. Aim of the production test is to extract methane gas from methane hydrate-bearing layers by depressurization method (Yasuda et al, 2007).

Sonic data were acquired by open-hole logging just after drilling and by cased-hole logging before/after the production test by the SonicScanner which is developed by Schlumberger. This new sonic tool is able to acquire sonic data under condition of cased hole though it is difficult to acquire sonic data in cased-hole by conventional tools. According to comparisons and evaluations of the sonic data of open-hole and the cased-hole logging before the production test, it was recognized that both data were matching very well. Because methane hydrate-bearing layers are unconsolidated or soft in this area, it is easy to distinguish real P-wave data of sediments from sonic wave data of stiff casing.

From the reservoir analysis by the open-hole and cased-hole logging data, a production zone was set at intervals of 993 to 1005 m below surface.

After the production test, S-wave velocity decreased at the production zone compared to one before the production test. It must be why methane hydrate at the production zone dissociated. Supporting the conclusion, P-wave was not detected at the production zone. The P-wave could not observe because of the drop of P-wave velocity than the velocity of water in pore space.

It is considered that methane hydrate-bearing sediments at the production zone are correspondent to matrix-support type from the relationships between Vp, Vs and Vp/Vs and methane hydrate saturation (Inamori et al., 2008). By the relationship between S-wave velocity and methane hydrate saturation, it is estimated that methane hydrate saturation decreased from over 70% to below 10% near the borehole at the production zone. Unfortunately, dissociation depth to horizontal direction could not clarify in this production test.

This study has been conducted as a part of the research undertaken by MH21.