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The science program for the first offshore production test of methane hydrates

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As a part of the study program of the Research Consortium of Methane Hydrate Resources in Japan (MH21), and to develop a production technique, the world's first gas production test form gas hydrate bearing marine sediments will be conducted in early 2013 in the Daini Atsumi (Atsumi No.2) Knoll area off Atsumi peninsula, the Pacific coast of Japan. In the area, past seismic surveys and a drilling campaign revealed existence of a gas hydrate concentrated zone (a turbidite sediment in which gas hydrates fill pore spaces of sandy layers with high saturation) has been discovered in a 50-70m-thick interval around 300m below seafloor at a location of 1000m water depth.

During the production test, the depressurization technique will be applied in which pore pressure is drawn down by formation water production through a wellbore to dissociate the gas hydrates for several weeks. Two and three-dimensional seismic surveys and geophysical logging and coring during the METI Tokai-oki to Kumano-nada drilling campaign have been conducted. For the 2013 production test, one production well and monitoring holes are drilled in early 2012, and intensive logging is planned in one of the monitoring holes. Also another hole dedicated for coring will be drilled to take pressure cores to conserve gas hydrates in samples. In the location, a geotechnical survey had been done with core sampling from shallower sediments than gas hydrate concentrated zone and a cone penetration test in February 2011. Those data and samples are used to develop reservoir characterization models.

One of the monitoring holes is kept open by steel casing to allow cased-hole geophysical logging before and after the production test to detect alternation of petro-physical parameters including gas hydrate saturation. All of the monitoring holes have temperature sensors to detect temperature drop due to gas hydrate dissociation. Extended-term temperature monitoring until half year later than the end of the production test will be done in some of them for the monitoring of temperature recovery. A geophone array in an ocean bottom cable (OBC) will be deployed for a multi-component and time-lapse seismic survey on the seafloor.

During the flow test, water and gas production rates, downhole temperature and pressure will be monitored. Geochemical data will be taken from samples. Comparison between actual well response and computed value from the established reservoir model will correct and improve our knowledge about reservoir characters and forecast of long-term productivity of the well.

Keywords: methane hydrate, production technique, field test