

Geological Surveys for CCS Demonstration in Kitakyushu, Western Japan.

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Evaluation study of site screening for CCS large-scale demonstration in Japan was performed by Japan CCS Co., Ltd. (JCCS) in 2008 by a subsidy from the Ministry of Economy, Trade and Industry of Japan (METI). In this study, the Kitakyushu site, western Japan, was selected from 115 candidate sites as one of the three most potential candidate sites for the CCS demonstration. The Kitakyushu is the only candidate site in the western Japan while the others are located in the eastern Japan. The Kitakyushu is also the unique site where Paleogene formations are considered as a target of CO₂ storage. Therefore, storage capacity of CO₂ in Japan will be expected to increase if enough performance of reservoirs and seal formations can be confirmed by the investigation and demonstration of the Kitakyushu site. Verification of the storage performance of the Kitakyushu site will contribute to evaluate the storage capacity of the Paleogene formations at the other sites where similar formations are distributed.

The Kitakyushu site does not have enough information of deep subsurface geology. Therefore, as a first phase, a series of basic surveys, consisting of a gravity survey, drilling of a survey well, and a 2D seismic survey were carried out for a geological evaluation of the site. Gravity analyses with supplemental gravity measurements were carried out in 2009 and 2011. Drilling (Kitakyushu CCS-1: 1180 m), 2D seismic survey around the well and VSP (Vertical Seismic Profiling) using the well bore were carried out in 2010. Sedimentary facies analysis and integrated geological analysis using all the acquired information through the surveys were carried out in 2011. A shape of the sedimentary basin and a general geological structure were delineated clearer than ever before by the gravity survey. The survey well was drilled into the basement rock lying below 1000 m for the first time in this area. Stratigraphy was confirmed by this drilling. Structural data including strike and dip around the well was obtained by the VSP and the 2D seismic survey. Moreover, initial conceptual geological model was constructed by integrating these various geological data.

Invaluable subsurface geological data for the site evaluation were obtained by these surveys. These data were mainly obtained in a limited area onshore in Kitakyushu city. However, the Paleogene reservoirs are estimated to be distributed widely under the sea. Geological data from the wide offshore area is required for a regional evaluation. In 2012, as one of the surveys for the evaluation, a preliminary 2D seismic survey was carried out at the coastal and the shallow marine area of Shimonoseki city.

This paper summarizes a part of the result of "CCS Demonstration Project in Japan" which was commissioned by METI to JCCS.

Keywords: CO₂ geological storage, CCS pilot-scale demonstration, Paleogene