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Well log and Seismic Application in Delineating CBM Sweet Spot in Berau Basin, East Kalimantan

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Abstract. The study area is situated in the northern part of Berau Basin Northeast of Kalimantan. In the area Sajau Formation is the main coal bearing formation. The Sajau Coal were range from Lignite to sub bituminous, low ash content, and low to high cleated coal. Different with the conventional reservoir, coalbed methane reservoirs have sweet spot that are a function of structural/cleat and stratigraphy of the coal seam. The seismic data provides excellent image of faults and stratigraphy of coal seams are very much essential in CBM exploration as delineating the CBM sweet spot. Well log and acoustic impedance inversion can be applied in such a way to provide added insight to the coal distribution and cleat directions in coalbed-methane reservoirs. In this technique the property of acoustic impedance is of much importance in identifying different rock formations, which are associated with coal, and it has been successfully implemented.

Keywords: well log, seismic, coalbed methane, sweet spot, Berau Basin.

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INTRODUCTION

Natural gas is the fastest growing primary energy fuel in the world with demand growing more rapidly than any other primary energy source. The coal bed methane is one of the unconventional reservoirs has increasing percentage contribution of the total amount of oil and gas production in the world. Some researcher have been discussion the limitations of seismic resolution in looking at the characteristics these unconventional reservoirs.

The research location is the Berau Basin, which is the one of the biggest coalbed methane basin in Indonesia with has big potential of CBM around 17.5 Trillion Cubic Feet (TCF). This also supported by the study of Delmar Mining [1] indicate the coal thickness of Sajau Formation in Berau basin have the total coal reserve up to 225 million tons. Two coal bearing formation in Berau basin are Sajau Formation and Latih Formation (Fig. 1)

The aim of the use of geophysical data from well log and seismic attributes to identify the characteristics of higher-producing coal lithologies, gas content and fracture permeability; and delineate CBM sweet spot by seismic attributes and well logs data.

CONTRIBUTION OF GEOPHYSICAL WELL LOGS AND SEISMIC IN COALBED METHANE EVALUATION

The CBM "sweet spots" is defined as the location of good coal deliverability with reservoir condition exist or the coal characteristics are well-aligned with optimal gas content in certain areas. The mapping deliverability the primary objective of attribute analysis. The density, velocity, cleat porosity and gas content of coal layer at discrete well locations can be measured directly well logs data without any ambiguity [2]. The seismic data provides an excellent image of structural and stratigraphic complexity, but only less direct estimates of rock properties [3]. The integration information from well logs with the seismic data which defined as the acoustic impedance inversion method can better provide rock properties. Further, the initial model for all the inversion were constructing.

The acoustic impedance is the product of seismic velocity and density [4] is a basic physical property of rocks. Seismic traces are converted into pseudo reflection-coefficient time series by appropriate initial