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DEPOSITIONAL ENVINRONMENT AND PALEOCURRENT THE MIDDLE OF WARUKIN FORMATION BASED ON SEISMIC AND WELL LOG DATA IN NORTH-EAST PART BARITO BASIN, SOUTH KALIMANTAN

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ABSTRACT

Explorations in the Barito basin has started nearly 100 years and was marked by the discovery of the Tanjung Field in 1938 (Maso at all 1993). The middle of Warukin Formation is one of the reservoir formation in the Barito basin of North-Northeast. Barito Basin is located between Sundaland in the west and Meratus in the east (Satyana, Awang.1994). An understanding of the depositional environment and paleo-current will be very useful for the exploration and field development optimization of oil and gas.

The data used in this researcher seismic 3D data and well data. From the existing data created seismic facies maps and correlation maps well with the markers used datum is the Top Formation Middle Warukin.

Downlap termination pattern found on the seismic line 75H - 37 at the lower limit indicates the time of formation of this facies occur sea level rise. Configuring the parallel reflection pattern - subparallel and divergent indicate the depositional environment is shelf / platform or delta platform (Serra, O, 1990). Coarsening upward to fining upward pattern relatively evolved from wireline log analysis, in which a pattern is formed on the shore face transgressive delta then serrated pattern formed in the shelf. Based on the seismic data and log data as well as supporting data from the regional geology of the Barito Basin, it can be interpreted that the study area is formed on the delta depositional environment - shelf.

Paleo-current study area can be determined based on seismic facies maps and regional conditions Barito Basin. Of seismic facies maps can be interpreted Paleo-current direction is relative to the south - west with relative sediment supply from the
north - east.

Keywords : Depositional Envinronment, Paleocurrent, Barito Basin, Warukin Formation

INTRODUCTION

Barito Basin North-Northeast part is one part of the Barito Basin in which there Warukin Formation and Formation disarray that is potentially formations containing hydrocarbons. (Anonymous, 1988)

In the Barito Basin 2D seismic survey has been carried out in 1970-1993 that are used to perform the analysis. (Anonymous, 1988) and the evaluation method of seismic stratigraphy and expected from this method will be determined petroleum system is developed.

In this paper is presented the analysis of the log and seismic Formation Warukin Midsection. The purpose of this paper to obtain a description of the type and pattern of distribution of facies and depositional environment Warukin Midsection Formation. Hopefully, through this paper can be further references regarding the Barito Basin exploration in the North-Northeast, especially in the Central Part Warukin Formation.

METHODOLOGY

This research was conducted by means of seismic analysis contained in the study area were correlated with drilling wells that passed by the seismic cross section (well seismic tie).

Data Collection Method

Beginning with a literature search of the Barito Basin, then on the next stage of data collection is done under the surface in the form of research support Check shot, well

summary of data, log data, seismic data, and base maps.

Methods of Data Analysis

Stages of processing and data analysis consists of several steps, namely:

Making Time Depth Curve (TDC), the binding of well data with seismic data (Seismic Well Tie), the search horizon seismic cross sections, facies mapping, and correlation wells.

RESULTS

The focus of this research is on the formation Warukin Midsection. The data used in this study comes from three wells (AB, AC, and AD) in the form of data wireline logs and seismic cross section (figure 2).

Data Time Depth Curve (TDC)

After the seismic well tie can be done piking. Used three pieces of data Time Depth Curve, namely the wells AB, AC, and AD

From the data on wells Time Depth Curve AB, it is known that the formation Warukin piking Top Midsection (horizon 1) starts at 205 m, piking Warukin Top Bottom Formation (horizon 2) starts at 590 m, and piking Top scattered Upper Formation (horizon 3) starts at 760 m.

Seismic Analysis of Cross-section

Seismic analysis and interpretation is done only at intervals Formation Warukin Midsection. In this seismic horizon is obtained 3: horizon 1 (blue), horizon 2 (yellow), and horizon 3(green). Where the position of the Central part of the formation Warukin horizon contained between 1 (blue) and the horizon 2 (yellow) or at 205 m - 889 m for seismic 87H-15, and at 339 m - 820 m for seismic 87H-02. Seismic section 87H-02 and 87H-15 is used as a key path. Seismic cross-section data analysis for Formation Warukin Midsection contained in the study area there are 21 seismic line

Based on the analysis of seismic parameters resulting seismic facies map Warukin Midsection Formation interval. On the map there are two interpreted seismic facies units, namely:

Seismic Facies A

This facies located in the northern part of the seismic facies map interval Formation Warukin northern section (Figure 4). The dominant pattern is divergent reflection, the reflection pattern is further to the south turned into parallel- subparallel thus making the upper limit and lower limit are serodiscordant. Characteristic of this facies is the amplitude was varied between - high, medium frequency - high, continuity is - good. Continuity seismic trending northeast - southwest toward the northeast, the better, while the seismic continuity trending northwest - southeast is getting to the southeast, the better. There downlap termination pattern relative to the south at the lower limit and the upper limit toplap (seismic 87H - 02).

The existence of divergent reflection pattern characterizes this unit or units form wedge-shaped lateral wedge caused by thickening of the reflection cycle and variations in precipitation and formed at relatively oblique paleogeography. Downlap termination pattern is found at the lower limit indicates the time of formation of this facies occur sea level rise. Based on the above analysis indicates that this facies is in an environment with weak energy - and is being interpreted in the delta environment.

Seismic facies map B

This facies located in the southern part of the seismic facies map Midsection Warukin Formation interval. The dominant pattern is subparallel reflection - parallel to the upper limit and lower limit concordant. This facies is characterized by the amplitude varies between medium, medium frequency, continuity is - good. Continuity seismic trending northeast - southwest toward the northeast, the better, while the seismic continuity trending northwest - southeast is getting to the southeast, the better. There downlap termination pattern relative to the south and Onlap toplap at the lower limit and the upper limit (seismic 75H - 37)

Subparallel reflection pattern - parallel bedding pattern shows relatively parallel with the ongoing process of constant deposition and paleogeography formed on a relatively flat. Downlap termination pattern is found at the lower limit indicates the time of formation of this facies occur sea level rise. Based on the above analysis indicates that this facies is on the environment and the energy that is being interpreted in the delta environment.

Wireline Log Analysis

Analysis was conducted on the wireline log analysis log form (log shape), the pattern of log (log pattern), and the change log deviation curves (log deflection). The types of logs are used as a basis for this qualitative analysis, that Gamma Ray Log. Lithological interpretation of the results of the study wells, known lithology penetrated by drilling comprising sandstone and mudstone. The results of this analysis serves to provide an overview of the depositional environment in detail the study area, where the interpretation of log data combined with seismic data that will interpreted depositional environment and

this area of research is the goal of this research.
Wireline log analysis did in 3 wells on the wells AB, AC, and AD

Wells AB
Wells at the H-1 has a thickness of the layer formation Warukin Midsection thick as 390 m depth interval starting from 640 m to 250 m intervals. From the interpretation of well logs AB is a growing likelihood that facies of the shelf (Serrated) Fill in the direction of tidal-channel (bell shaped) to the distributary mouth bar (Funnel)

Well AC
Wells at the H-2 formation layer has a thickness of 420 m Warukin Midsection starting from a depth interval of 940 m to 520m intervals. From the interpretation of well log facies AC is a growing possibility of the shelf (Serrated) Fill in the direction of tidal-channel (bell shaped) to distributary channel - fill (blocky) to the distributary mouth bar (Funnel).

Wells AD
Wells at the H-3 has a thickness of the layer formation Warukin Midsection 580 m depth intervals starting from 1030 m to 450 m intervals. From interprets log on AD wells there may be a pattern with a funnel shape Coarsening up ward, bell shape pattern with fining up ward, and symmetrical with the shape coarsening upward then turned into Funning upward. It can be concluded that the H-3 wells are formed in the delta system in the delta shore face (symmetrical) Fill in the direction of tidal-channel (bell shaped) to the distributary mouth bar (Funnel).

Based on data from 3 wells withdrawal transactions are carried out on the correlation and the correlation is the primary datum used is top middle Warukin Formation. Withdrawal of this datum has the objective to reconstruct the geological conditions and paleogeography basins are drawn according to the similarity of the deposition time. The method used is the correlation curve matching or pattern matching log curves.

Depositional Environmental Interpretation.
The results of seismic data interpretation with seismic facies analysis of known seismic facies units are 2, wherein the seismic facies units A reflection of the dominant pattern is divergent and there downlap termination pattern relative to the south at the lower limit and the upper limit toplap (87H seismic - 02). Divergent reflection pattern shows a pattern that is relatively parallel to bedding deposition process that lasted constant and paleogeography formed in a relatively flat. In seismic facies unit B is located in the southern part of the seismic facies map and the Formation interval Warukin Midsection, forming the dominant pattern is subparallel reflection - parallel as well as the upper limit and lower limit concordant. There downlap termination pattern relative to the south and Onlap toplap at the lower limit and the upper limit (seismic 75H - 37). Downlap termination pattern is found at the lower limit indicates the time of formation of this facies occur sea level rise and visible from the configuration of parallel reflection pattern - subparallel and divergent indicated shelf depositional environment / platform or delta platform.
From the analysis of the log electro-facies motif pattern that develops in Warukin Formation wells in the middle section, where characterization coarsening upward (funnel) reflects the regression of sea level changes or evolving patterns in the distributary mouth bar, Funning upward pattern (bell shaped), reflect changes sea level transgression towards which a pattern is formed on the Fill-channel tidal areas. Furthermore, the shape of the pattern is symmetrical with upward coarsening upward then turned into Funning which a pattern is formed on the shore face transgressive delta, then Serrated pattern in which a pattern is formed on the shelf.
Based on the seismic data and log data as well plus supporting data of the regional geology of the Barito Basin, it can be interpreted that the study area is formed on the delta depositional environment - shelf

Paleo-current
Direction of deposition of the study area can be determined based on seismic facies maps and regional conditions Barito Basin. Of seismic facies maps can be interpreted relative to the direction of deposition of the south - west with relative sediment supply from the north - east. This is supported by the data in which the facies maps at each seismic facies units that are progradation downlap termination relative to the south on the orientation of the seismic southwest - northeast (in cross section 87H- 75H- 37 and 02). Continuity seismic also indicates that the southward continuity of diminishing returns (e.g. in cross section 87H - 03, 90H-37 and 87H - 02)
Based on paleogeography East Kalimantan and South Kalimantan during the Miocene - Pleistocene Pliocene there are two sedimentary orientations, i.e. from the east - southeast and northwest direction. And from the position or location of known Barito Basin to the north is limited by altitude and mountainous Paternoster Meratus east.

Paternoster altitude in the mountains north and east Meratus in the older age formations that exist in the study area. The sediments were deposited in the study area are interpreted as the result of erosion of mountains Meratus in east and north.

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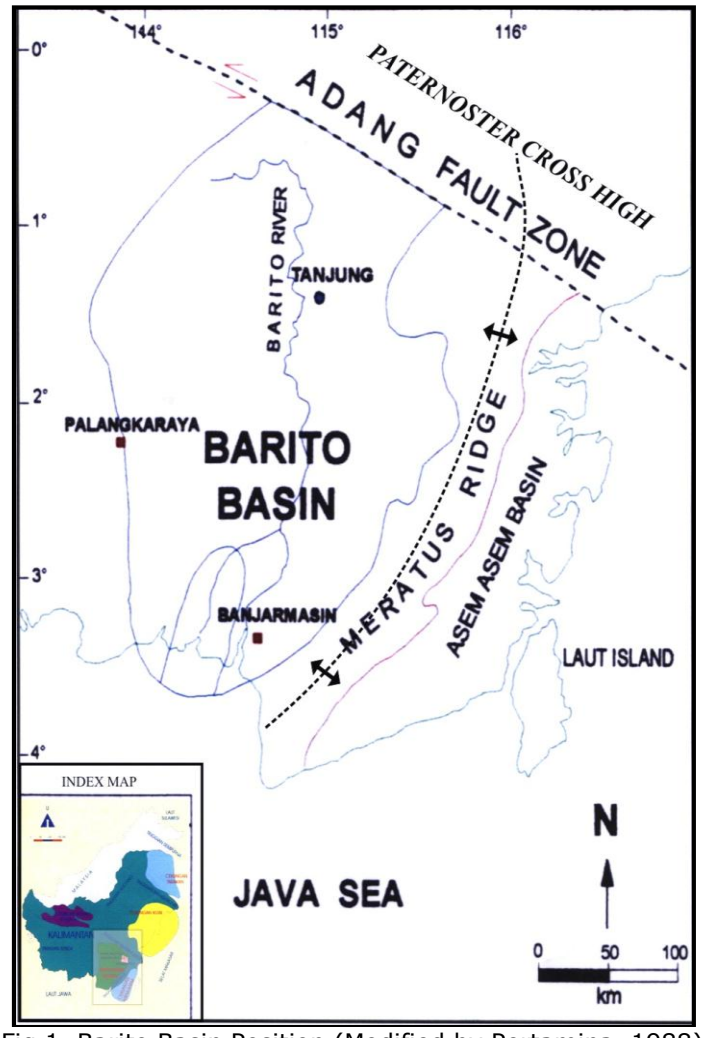

Fig 1. Barito Basin Position (Modified by Pertamina, 1988)

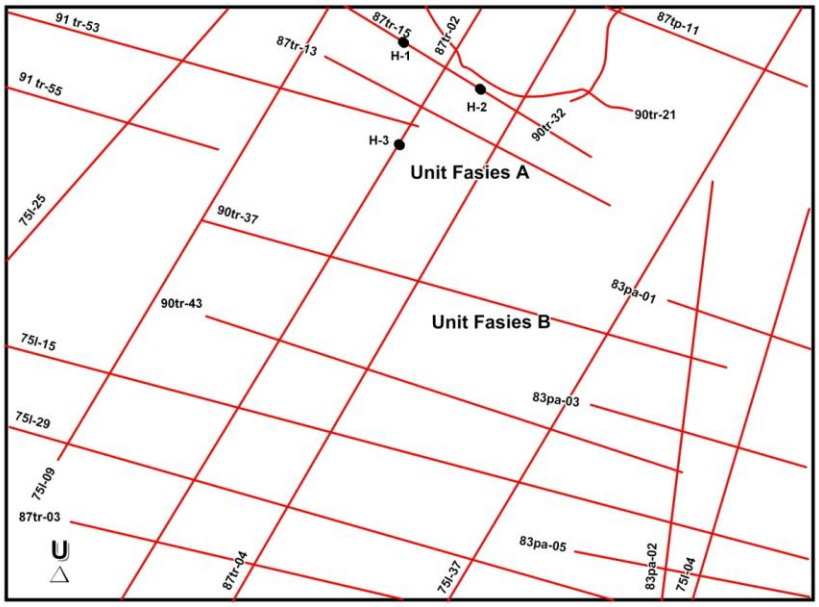

Fig.2 track seismic research area

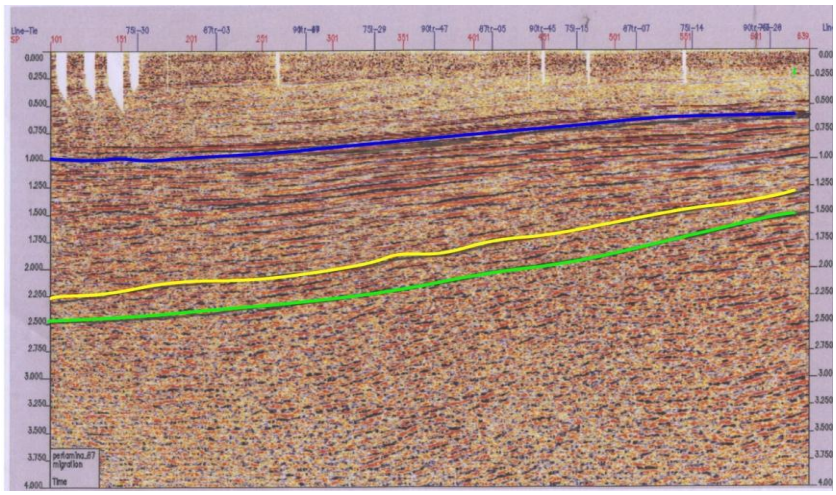

Figure 3: Cross-section Seismik87H-02

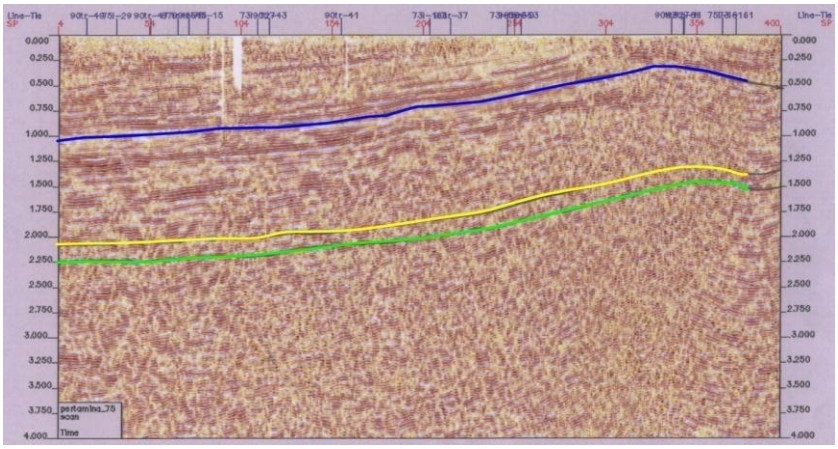

Figure 4: Cross-section of the Seismic 75 L-37

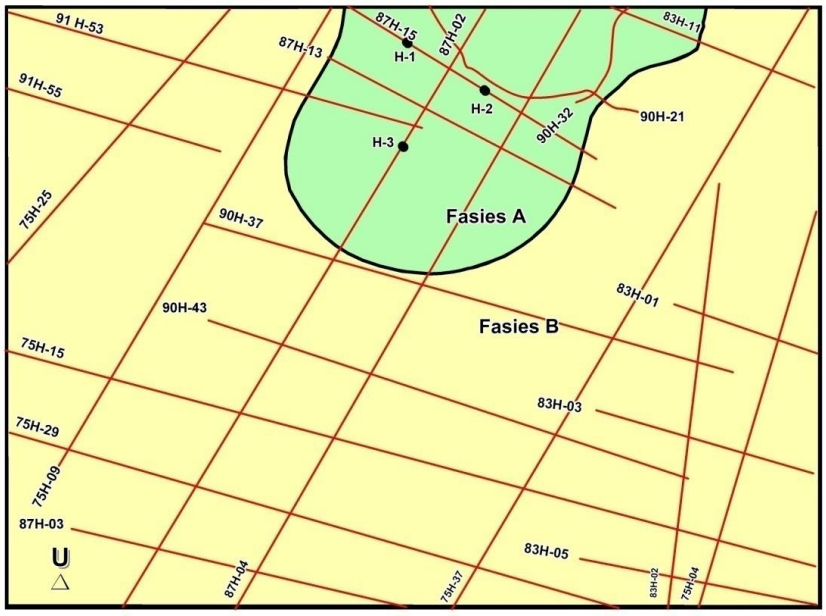

Figure 5 Map Formation interval facies sesmik Warukin Midsection

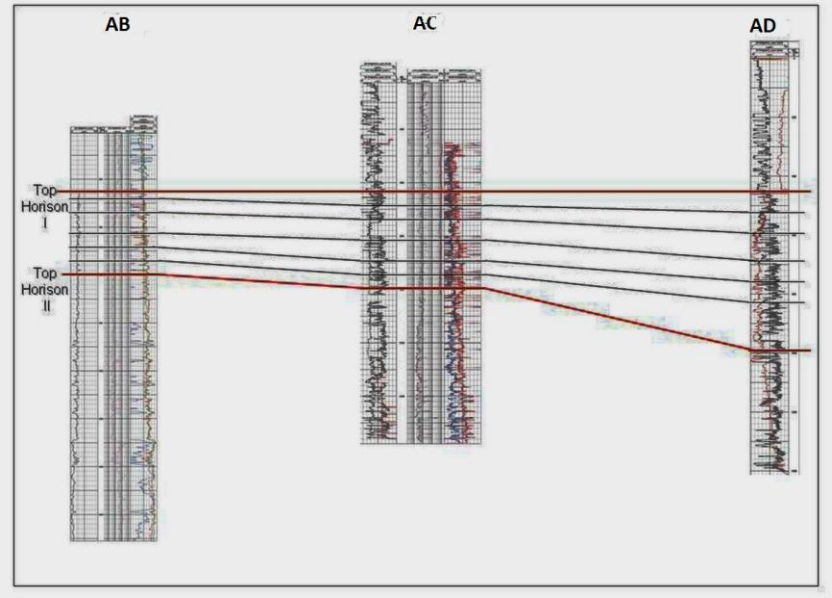

Figure 6 Correlation Well AB, AC, and AD

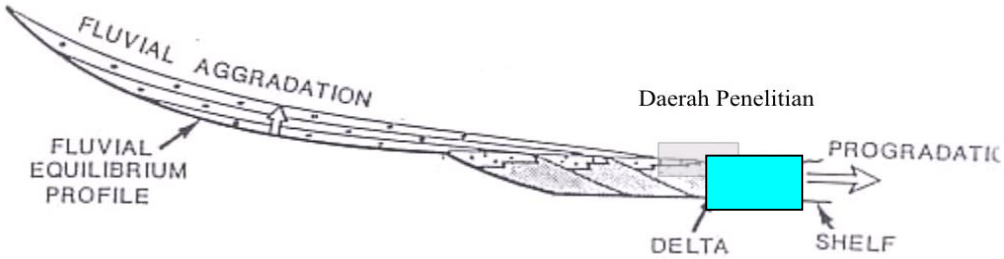

Figure 7 The position of the study area in order sedimentation basin (modified Allen 1994)