CHAPTER 1

INTRODUCTION

1.1 General Statement

Nowadays, petroleum is considered the world's important natural resource because it is very necessary fuel for both the developed and developing countries. In additions, the petroleum industries have the role to effect to a global economic crisis. For this reason, the petroleum exploration and production would like to have the accuracy and preciseness in the reserve calculation and the reservoir location prediction to prevent the loss of time and expenditure. In the exploration and the development period, subsurface stratigraphy and stratigraphic correlation is important because we can know the geologic strata succession in vertical and lateral (especially, in the subsurface) which helps the geologist and geophysicist for the development planning and predicts the new exploration well in the future.

The stratigraphy in Arthit Project is currently divided to 4 major formations, FM 0, FM 1, FM 2 and FM 3 and subdivided FM 2 to 5 units (see in the chapter 2). However, the FM 1 can not be divided because it is not seen the obvious coal, shale bed or the other marker to divide the sequences and correlate the strata, which is the problem for stratigraphic correlation. Now, we have the tool for resolve this problem –CycloLog Program- which uses the theory of climate stratigraphy.

Climate stratigraphy is basically the stratigraphy of climate change. The idea came from the concept that orbitally forced climatic changes play a significant role in determining lithofacies changes. This concept is defined in the global cyclostratigraphy model developed by Perhutter and Matthewe and published in 1990. Basically, global cyclostratigraphy uses the climate-lithofacies relationship as the driving mechanism in a forward-modelling approach to understanding lithofacies development at the basin scale.

1.2 Objective

The objective of this independent study is focus on the stratigraphic correlation in the Formation 1, Platform B, Arthit Project, Gulf of Thailand by climate stratigraphic method using CycloLog software.

1. To interpret stratigraphic sequence by using the climate-stratigraphic approach to generate well zonations for the individual wells showing the major depositional trends and trend changes.

2. To construct the subsurface correlation by using the same approach to generate well-to-well correlations of time-equivalent depositional packages in the study wells.

1.3 Scope of works

In this study concentrates on well log data (Gamma Ray log data), there are 18 wells which consist of 2 wells of exploration well and 16 wells of development well in Platform B. The scope of this study is following.

1. To calibrate tool by comparison the stratigraphic scheme and stratigraphic correlation between the litho-stratigraphy and the climate stratigraphy in the Formation 2, Platform B, Arthit Project, Gulf of Thailand.

2 To interpret the stratigraphic scheme and stratigraphic correlation base on the method of climate stratigraphy in the Formation 1, Platform B, Arthit Project, Gulf of Thailand.

1.4 Study Area

Arthit field is in the North of Malay Basin located in the Gulf of Thailand eastward of existing Bongkot field. The concessionaire consists of blocks 14A, 15A, and 16A covers the total acreage area of 3,933 km^2. The perspective area is extended approximately 140 km North-to-South and 50 km West-to-East. The West is adjacent to Bongkot field. Meanwhile the South is next to the Joint Development Area (JDA) concession. The concession was garbed to PTT Exploration and Production Public Co. Ltd. (PTTEP) by Department of Mineral Resources (DMR) under Petroleum Act, B.E. 2514, since 27 February 1998. The area is located in the Gulf of Thailand at 250 km northeast of Songkhla and 35 km east of Bongkot (Figure 1.1).

1.5 Data sources

All data in this study are supported by PTT Exploration and Production Public Co. Ltd., which comprises of the well log data totally 18 wells.

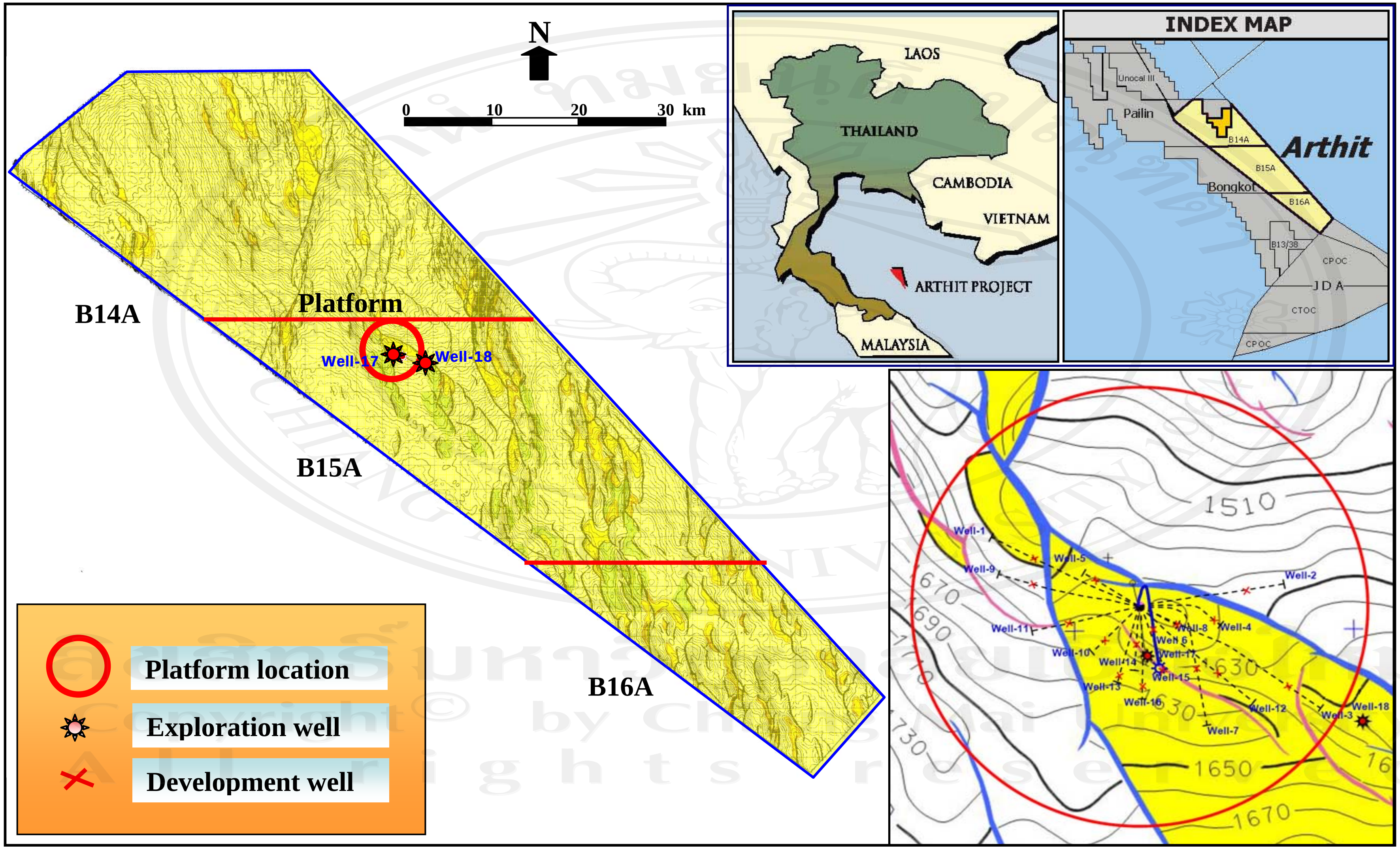

Figure 1.1 Map showing the Arthit area of the North Malay basin in the Gulf of Thailand (modify from PTTEP, 2007).

1.6 Expected results

This study will provide the stratigraphic scheme and stratigraphic correlation base on the method of climate stratigraphy through wireline log conceal information encoded in their waveform properties, spectral trend (or INPEFA) curve.

The result can be applied for 3D reservoir model and in future exploration and development planning.

1.7 Literature reviews

De Jong *et al*. (2006) utilized wireline log in the climate stratigraphic method to erect the stratigraphic scheme and stratigraphic correlation in the Triassic succession of the southern UK Central Graben, for resolve the problem of Triassic succession, lack of regional seismic markers, poor recovery of microfossils, and regional structural complexity.

De Jong *et al*. (2007) utilized wireline log in the climate stratigraphic method to solve the correlation problem of Carboniferous succession of Southern North Sea, Westphalian succession. The difficulties of correlation in the Carboniferous are compounded by the variable extent of the erosion of the top of the succession beneath the Variscan unconformity. This study has demonstrated that a scheme of nine stratigraphic packages and their higher-order subdivisions, based on interpretation of spectral trend curves, provides a regionally applicable stratigraphic framework. It is the first stratigraphic framework to be successfully applied at such a regional scale, both across the international border, and across significant facies changes.

Armitage-Viotti (1977) and Ramli (1988), both used the well logs, seismic signatures, and paleontology in Malay basin to recognize the widespread occurrence of shale markers and marine transgressive pulses. The ages of the strata range from Oligocene to Recent and the dominance of nonmarine sediments in the Oligocene-Miocene section has limited the biostratigraphic schemes.

Arthit Asset within PTTEP adopted stratigraphy in the Arthit area from Bongkot Asset, currently divided into four major formations (Fm0, Fm1, Fm2, and Fm3) and five units following the nomenclature which lied on the Pre-Tertiary basement. The stratigraphic succession is comprised of Tertiary sandstones, shales, and coals. These rocks were primarily deposited during Oligocene to Late Miocene time in depositional environments ranging from fluvio-lacustrine to lower delta plain-marginal marine. Depositional facies were mainly controlled by tectonic evolution, transgressive, regressive cycles, and syndepositional faulting.