[EA]Unlocking Hidden Reserve Potential in Northern Pattani Basin, Gulf of Thailand*

Warin Lobtong[1] and Kenneth Lewis[1]

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[1]Chevron Thailand E&P Ltd, Bangkok, Thailand (WLOB@Chevron.com)

Abstract

The strategy in northern Pattani Basin has been concentrated on well-factory style drilling where the focus has been on targeting multiple fault trapped sand reservoirs at the crest of structures. Production from reservoir sands has been commingled. Proper reservoir management of these sands provides the key to unlocking their remaining potential and sustaining future field production. The reservoir management approach focuses on utilizing existing production, pressure, well log and seismic data, and collecting additional data, to better understand and characterize the reservoirs and their dynamics. Once these reservoirs are better understood, appropriate reservoir management techniques, including single zone production and waterflooding to optimize reservoir performance, can be initiated. Significant opportunities to unlock hidden reserves has been identified, based on these reservoir management works.

The seismically mappable full-to-base oil sand with gas cap, TN reservoir was originally found in two development wells drilled in 2006 (A-10 and A-01). The sand was identified and assessed as a suitable horizontal well candidate reservoir and eventually the A-24H horizontal well was drilled to improve recovery from this reservoir (Figure 1).

Two to four years later the B-21 and C-25 wells were drilled in different fault blocks and penetrated to the equivalent depth of the TN reservoir. Unexpectedly, pressure depletion has been observed in these pay sands. Based on the new pressure data the TN reservoir was re-analyzed to determine the source of the depletion in the equivalent sands. This analysis was performed by integrating well log correlation, pressure and seismic data. The re-evaluation indicated that the TN reservoir was larger than indicated by the previous study. The new interpretation of the TN reservoir spreads the sand across three fault blocks in an east-west direction. It can be separated into three segments which are West, Central and East areas. Each of these segments are not fully disconnected from one another by the identified faults. There are open areas at each of the fault tips that allow all three parts of the reservoir to communicate with each other (Figure 2). The reservoir had already been produced and depleted in the Central area by the A-24H horizontal well before the B-21 and C-25 wells were drilled into the West and East areas, respectively. These conditions caused the depletion observed at the B-21 and C-25 locations.

Although the reservoir has currently been pressure depleted, only the West and the Central areas have been effectively produced. The East area has been identified as an un-swept area with substantial remaining hydrocarbon volumes. Consequently, this area is classified as a waterflood opportunity and new producers are required to be added in this area. The C-25 well is also planned to be a new producer for the TN reservoir. However, the C-25 well, located in the southernmost region of the East area, is unable to drain hydrocarbons for the entire East area even with A-22 as an injector. Therefore, one to two future wells will be planned and drilled in the northern part of the East area to ensure that all producible reserves will be swept from this region.

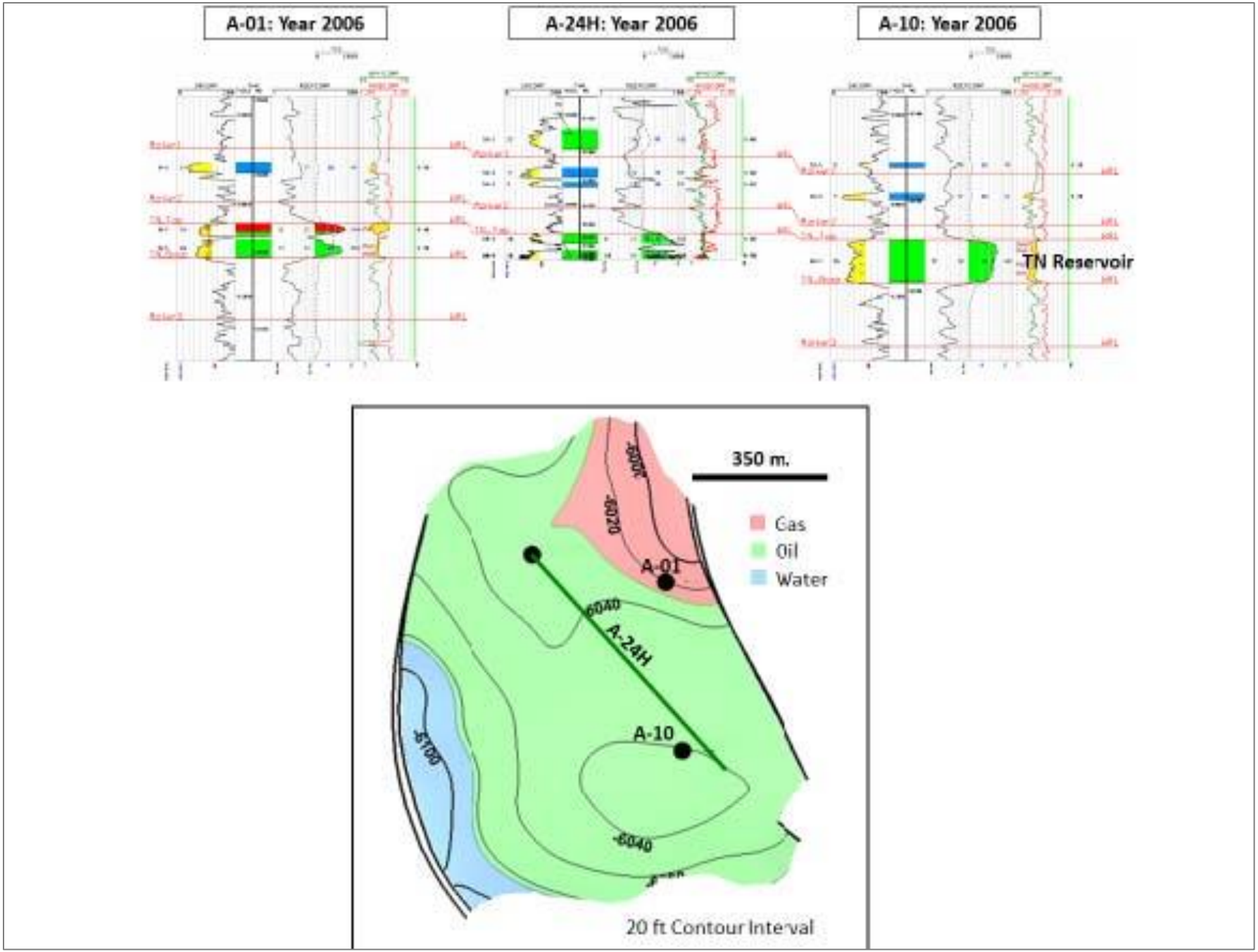

Figure 1. The TN reservoir's log responses and its top surface structure map during year 2006.

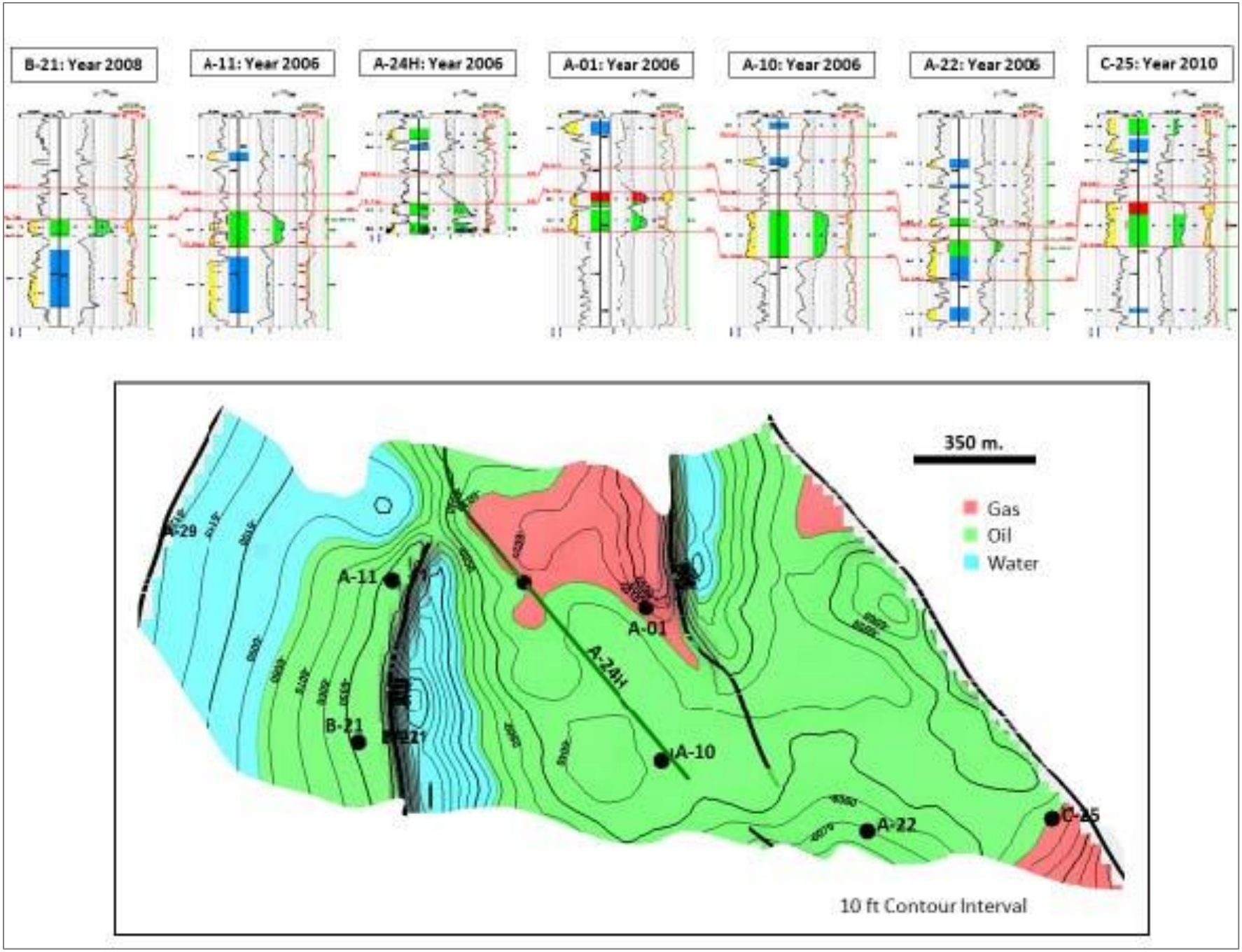

Figure 2. The TN reservoir's log responses and its updated top surface structure map.