

# Lithofacies and Depositional Environment from Geophysical Log in Samut Sakhon, Deep groundwater Lower Chao Phraya Basin, Thailand

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Most recently, a 1,008-m-deep groundwater exploration well was completely drilled at Wat Sahakorn Kositaram, Khok Kham Subdistrict, Muang District, Samut Sakhon Province. The drilling site is in the Tertiary Thon Buri sub-basin, which is part of the Lower Chao Phraya basin, about 3 km away from the northern coastline of the Gulf of Thailand. This study aims to investigate the depositional environment by comparing lithological data with borehole geophysical log.

According to the gamma-ray log, it could be categorized into two main groups based on patterns and shapes, consisting of the cylindrical shape and the bell shape. The cylindrical stacking patterns were found at 0-120, 150-180, 500-640, and 940-1,008 meters below the surface. This type consists of rounded, fine to coarse-grained sand interbedded with high plasticity clay. It represents a uniform distribution that can imply that sediments were deposited in the fluvial channels. The bell shapes were found at depths of 120-150, 180-500, and 640-940 meters. This unit found granule-size sediments with high roundness and sorting together with rounded, fine to coarse-grained sand interbedded with thin clay layers. The electrical log showed a gradual upward increase in gamma response known as the fining-upward sequences of sediments. This pattern usually implies a decrease in depositional energy and generally occurs in the fluvial environment, such as channels and alluvial fans.

According to the 2D seismic data, Nuangchamnong et al. (2016) interpreted that the Thon Buri sub-basin is underlain by the Pre-Tertiary quartzite unit. The basin had started extending in the Early Oligocene (about 30 Ma) and were active until the Late Miocene-Pliocene time. The Tertiary sedimentary layers had been deposited during the extension and subsidence of the basin. Later they were covered by unconsolidated sediments during the Quaternary by the Chao Phraya River. These published data were applied to correlate with a 1,008-m-deep well operated by the Department of Groundwater Resources. Groundwater is occupied in the void spaces of sediments that were primitively accumulated in the fluvial environment. The depositional environment changed at least three times, consisting of the alluvial plain (23 Ma), fluvial (16 Ma), and a complex interplay of alluvial, fluvial, and deltaic environments of the Chao Phraya River (2 Ma to present). The presence of thick sedimentary deposits make relatively good aquifers, and provide a much greater volume of useable water.

This study not only discovers the deep groundwater resources, but also updates available groundwater data. Aquifers in the Lower Chao Phraya Basin were previously composed of 8 aquifers and had been used for more than 30 years. The recent study discovered 5 more aquifers at depths between 640 and 1,008 m. According to geophysical logging and groundwater analysis, deep groundwater resources are suitable, in terms of groundwater quality and quantity, to develop to support the industrial sectors which is a key driver to economic growth. Finding new water resources is a sustainable way to improve water security, and eventually leads to improving standards of living for people by having access to clean water for drinking, cooking, or washing.

**Keywords;** Depositional Environment, gamma-ray log, Deep groundwater, Thonburi Basin.

## Reference:

Nuangchamnong, K. (2016). Tectonic Evolution of the Thonburi Basin in the Lower Central Plain, Thailand. Chiang Mai J. Sci., 43(6) : 1306-1315