A Technical Review

for a PhD Thesis

"Identification of promising oil and gas bearing objects based on the petroleum system modelling in the central eastern part of the Gulf of Suez (Egypt)" by

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for the degree of candidate of geological and mineralogical sciences of

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The present dissertation concerns with modeling of hydrocarbons-bearing reservoirs in the central eastern parts of the Gulf of Suez using the available geophysical data. The main purpose of modeling process is to estimate hydrocarbon potentiality of this area in the Gulf of Suez. Modeling of this sector is very important, where thought of great exploration efforts in this area, which include many oil-producing fields, no regional models have been established to predict the most prospective horizons. Therefore, the author exerted his best effort, in the present thesis, to establish a new petroleum system model matching the distribution of the hydrocarbon-zones in 3D to guide the further future development and exploration plans.

This PhD thesis consists of an introductory part in addition to four technical chapters and a conclusion.

In the introduction; the author indicated the relevance of the research topic to the exploration efforts in the Gulf of Suez, novelty of his research, and the workflow of the applied methodology. The author indicated that he participated in six international conferences by many presentations for the present research results, i.e., the author received many enough comments to develop his research into the present version.

In the first chapter; the author showed the main structural elements and setting of the Gulf of Suez, in addition to its main sedimentary basins and stratigraphic sequences and classified them into pre, syn, and post-rift sequences.

In chapter two; acquisition and calibration of the airborne magnetic data were discussed, in addition to its processing steps. A set of RTP, Regional and residual magnetic-components maps were generated to construct a distribution map for the basement surface depth. In addition, a set of profiles were introduced passing though some wells that were used to control the depth to the

basement at these profiles. This chapter concluded that depth to the basement surface ranges from 500 m to more than 4600 m.

Chapter 3 describes the process of creating a 3D depth-based structural model of the hydrocarbon systems in the studied area based on the available seismic profiles and well log data. In addition, a set of depth-structure maps for the prospective formations in the study area were created using Petrel software. It is indicated that five locations are considered sedimentary basins with thick sedimentary cover and a relatively high depth to the basement (3000-4500 m). The petroleum systems were studied indicating the reservoir, seal, and source rocks, where the average TOC and HI values for each potential source rock were calculated.

In chapter four; the resulted accumulations of PetroMod software were presented and modelled in 3D view. These results indicated that the oil and gas accumulations are accumulated in seven reservoir zones including Nubia B, Nubia A-P1, Nubia A-P2, Nubia A-P3, Nukhul, Rudeis and Belayim reservoirs.
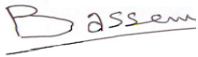

Decision & Recommendations:

- Through the present dissertation Ahmed Tarshan achieved his main research objectives, and applied the appropriate techniques and required calibration processes to get more precise 3D model for the studied province. The author successfully modeled the study area through applying the Petrel software for geological and structural modeling of the prospective horizons in the central eastern part of the Gulf of Suez.

- For further future studies and international publications, it is recommended to pay more attention to integration with detailed seismic profiles or cube in addition to better well log interpretation and processing to get more precise formation evaluation for the studied hydrocarbon-bearing horizons.

- The present study is based on delineating the depth to the basement rocks and estimating thickness of the overlying sedimentary sequences.

- In general, the aforementioned recommendation is just recommendations for further post-doc studies, while Ahmed Tarshan's thesis is a very good study in which the author applied a complete set of scientific tools and concepts. The obtained models and the final interpretation are of a scientific novelty.

- So, I recommend awarding the degree of candidate of geological and mineralogical sciences to Ahmed Ramadan Mohamed Tarshan.

The dissertation research entitled "Identification of promising oil and gas bearing objects based on the petroleum system modelling in the central eastern part of the Gulf of Suez (Egypt)" by Tarshan Ahmed Ramadan Mohamed presented for the degree of candidate of geological and mineralogical sciences of St. Petersburg State University meets the qualification requirements for candidate dissertations on specialty 25.00.10 - Geophysics, geophysical methods of mineral prospecting ".

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