AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE

INTEGRATION OF CONVENTIONAL AND ADVANCED WIRELINE TOOLS WITH CORE DATA AND GEOMECHANICAL STUDY FOR ESTIMATING THE PETROPHYSICAL PROPERTIES OF THE CLASTIC AND CARBONATE RESERVOIRS AND THEIR IMPACT ON RESERVOIR DEVELOPMENT PLANS IN SOUTH SANNAN FIELD, WESTERN DESERT, EGYPT.

A THESIS
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ABSTRACT

Objectives and Aim of Study:

In this study, the author is trying to shed light on the petrophysical characteristics of the clastic and carbonate reservoirs in South Sannan concession, Western Desert, Egypt. In the light of geological, and geophysical studies to evaluate and improve its hydrocarbon potentialities of South Sannan Field, Western Desert, Egypt through the following topics:

1-Geological Investigations including:

Reviewing the general geological setting of the concerned area using subsurface data gathered from well logs, geophysical data and previously published literatures with the aid of isopach, lithofacies, structural contour maps as well as cross sections.

2-Petrophysical Investigations:

Including analyses of the available borehole data for petrophysical analyses of the Reservoir intervals in concern as well as identifying its textural and structural characteristics, including analysis and interpretation of the conventional logs and core data. Methods of the well logging analysis and Computerized statistical processing including different relationships and cross plots for the study intervals. These are through the following:

I-Wireline Log Analysis:

Including analysis and interpretation of the available conventional wireline logs such as Density, Neutron, Gamma Ray and Resistivity tools to achieve the following:

A- Lithological and mineralogical identification of the studied interval.

B- Determination of the petrophysical parameters (total and effective porosities, fluid saturations, shale and matrix contents and permeability index), by using wireline analysis and compare it with the core petrophysical parameters.

C- Determining the reservoir characteristics (net sand, net pay, gas in-place and recoverable oil) for the hydrocarbon bearing zones of the studied intervals.

D- Evaluating the lateral distribution of thickness and depth of the hydrocarbon net-pays and calculating the gas reserves within the investigated area.

E- Advanced Wireline tools Processing and Interpretation including WBI, DSI

F- Special Spectral Gamma Interpretations Building a Python Script for Shale Content volume.

G- Petrophysical studies using FMI analysis

H- Integrated Analysis by results combinations and MDT

I- Integration with the Geomechanics Pore Pressure Prediction for the Area and Wellbore Stability.

II-Core Data Analysis:

Including the integration of the data deduced from core analysis to calibrate the wireline data in order to improve the data output from the data conventional analysis as following:

A-Calibrate the core porosity to the wire line porosity

B- Calibrate the Core Air Permeability to the wireline permeability.

C- Calibrate the Core grain density to the wireline grain density.

3- The integration study and Combination of the Results with Advanced Evaluation:

Include the integration and combination of results between the petrophysical evaluation and reservoir evaluation deduced from the well logging analysis and those derived from the core data of the concerned formation to evaluate the reservoir intervals and study its impact on reserve estimation of the study area. Advanced Petrophysical Evaluation using Unconventional Petrophysical workflow to analysis the source rock and Reservoir Evaluation using Borehole wireline Pressure modular tool and Saturation height modelling .

4- Finally, the study will end by

Reservoir Modeling which represents geological & geophysical modeling that involves available geological data (lithology of successions, structures of the field & nature of depositional environments of successions), geophysical data (seismic &well logging), and petrophysical data from cores & cutting laboratory reports (Porosity & permeability, etc...) & engineering data (pressure test data).

Expected results

1) Realizing distribution of facies, reservoirs & petrophysical parameters of each unit.
2) Hydrocarbon reserves estimations.
3) Identification of areas of pay zones.
4) Detect high & low certainty locations.
5) Field development technical plan.

Approval sheet for submission

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A Thesis Submitted in Partial fulfillment of the requirements of the Ph.D in Science

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