

**PETROPHYSICAL ANALYSIS OF QADIRPUR # 3 WELL,  
CENTRAL INDUS BASIN PAKISTAN**



A thesis submitted to Bahria University, Islamabad in partial  
Fulfillment of the requirement for the degree of BS in Geology

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2016**

## ABSTRACT

The main objective of the study is to evaluate the hydrocarbon potential of Qadirpur # 3 well. The well is located approximately 70 km to the northeast of Sukkur and 100 km to the east of Jacobabad in Ghotki, Sindh province, Pakistan. The tectonic structure encompasses the Mari- Kandh Kot High on the Punjab platform, a gently west dipping zone flanking the Indian shield. The purpose has been achieved by utilizing complete suite of wire line logs and the available well data. For evaluating hydrocarbon potential at reservoir level, one zone of interest has been in Sui Main Limestone. The reservoir zone is evaluated for the hydrocarbon potential in detail using set of equations and different formation evaluation charts by Schlumberger. Various physical properties like porosity, resistivity, volume of shale are calculated through different logs suites. The average shale volume calculated in Sui Main Limestone is 23.03%. The average effective porosity determined in the Zone of Sui Main limestone is 16.38%. The average water saturation determined in the Zone of Sui Main Limestone is 36.30%. The average hydrocarbon saturation determined in the Zone of Sui Main Limestone is 63.69%. The density and neutron cross plot chart reveal the reservoir lithology of selected zone i.e. Sui Main Limestone, is limestone. On the basis of calculated parameters, the marked zone is productive zone.

## ABBREVIATIONS

|                   |                                   |
|-------------------|-----------------------------------|
| Rxo               | Resistivity of Flushed Zone       |
| Rmc               | Resistivity of Mud Cake,          |
| Dh                | Borehole Size                     |
| Rm                | Drilling Mud                      |
| Rmf               | Mud Filtrate                      |
| Rmc               | Mud Cake                          |
| CNL               | Compensated Neutron Log           |
| PEF               | Photo-Electric Factor             |
| LLS               | Laterolog Shallow                 |
| LLD               | Laterolog Deep                    |
| MSFL              | Microspherically Focused Log      |
| SP                | Spontaneous Potential             |
| Ec                | Electrochemical Potential         |
| (Em)              | Shale or Membrane Potential       |
| (Elj)             | Liquid Junction Potential         |
| (Ek)              | Electro Kinetic Potential         |
| B.H.T             | Borehole Temperature              |
| $\Phi_{n-d}$ :    | Average Porosity                  |
| $\Phi_n$          | Neutron Porosity                  |
| $\Phi_{den}$      | Density Porosity                  |
| Ma                | Million Years                     |
| Fm                | Formation                         |
| V <sub>sh</sub>   | volume of shale                   |
| GR <sub>log</sub> | Gamma ray reading of formation    |
| GR <sub>min</sub> | Gamma ray minimum                 |
| GR <sub>max</sub> | Gamma ray maximum (shale)         |
| $\rho_{ma}$       | matrix density                    |
| $\rho_b$          | Formation bulk density            |
| $\rho_f$          | fluid density                     |
| F                 | formation factor ( $a/\phi_A^m$ ) |

|                   |   |
|-------------------|---|
| A                 | turtuosity factor                       |
| M                 | constant, cementation exponent          |
| Essp              | Static Spontaneous Potential            |
| H                 | Mud Cake Thickness                      |
| Sh                | Saturation of Hydrocarbons              |
| Sw                | Saturation of Water                     |
| Rmf <sub>eq</sub> | Resistivity of Mud Filtrate Equivalent  |
| D and PL          | Development and Production Lease        |
| OGDCL             | Oil and Gas Development Company Limited |



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