PETROPHYSICAL ANALYSIS OF KADANWARI WELL NO 10 & 11, MIDDLE INDUS BASIN, PAKISTAN

A thesis submitted to Bahria University, Islamabad in partial fulfillment of the requirement for the degree of BS in geology.

HABIB UR RAHMAN

IRSHAD HUSSAIN

SIBTE-E-HASSAN BUTT

Department of Earth and Environmental Sciences
Bahria University, Islamabad

2012

DEDICATION

“To our parents who have been by our side in every walk of life”

ABSTRACT

The main objective of research is to evaluate possible reservoirs in Well # 10 & 11 of Kadanwari gas field, which lies in Middle Indus basin, Pakistan. The said objective has been achieved by the petrophysical characterization of reservoir zones using wireline logs.

The methodology adopted to achieve the goal includes; Quality Check of the data set (complete suite of wireline logs), correlation of curves of different logs to demark the possible reservoir zones , measurement and computation of shale volume using gamma ray log, Resistivity of water using SP log, Porosity measurement by all porosity tools "neutron, Density and Sonic", Resistivity of invaded as well as un-invaded zones for the calculations and derivation of true resistivity and the saturation measurements using Archie's saturation equation.

The results of above mentioned analytical work done answered in positive, the zones marked through correlation of data show very good to fair hydrocarbon potential on the basis of evaluated clay volume, porosity and saturation component.

ACKNOWLEDGEMENT

(In the Name of Allah, the Most Merciful and Beneficent)

All praises are for Almighty Allah who blessed us with courage to cope with the odds of life and who enabled us to accomplish this project. We owe to the Holly Prophet (P.B.U.H) for the true guidelines of life.

We would like to pay our deepest gratitude to our loving parents, brothers, sisters and family for their prayers, encouragement and support. We are thankful to all of our friends who had provided us with the confidence and courage.

We are very much thankful to all the faculty members of the Department of Earth and Environmental Sciences, Bahria University for their valuable support and constructive ideas throughout our stay in the department.

We are glad to acknowledge the support and encouragement of our supervisor Mr. Mohsin Munir (OGDCL), PAKISTAN, for his heartiest contribution over the span of time to accomplishment of this project.

We would also pay our heartiest gratitude to Mr. Saqib Mehmood (Senior Lecturer), BAHRIA UNIVERSITY, PAKISTAN.

I would also like to pay regards and thanks from the core of our hearts to Mr. Ahsan Javed Deo, (OGDCL), PAKISTAN , for his encouraging help and guidance to complete this task.

Their needs to pay a bundle of special thanks to those special and true friends, who are around us like air. They have given us a boost in our lives and provided us a launching pad. Thank you so much!

Thank You All!

ABBREVIATIONS

d_h	Borehole diameter
di	Average diameter of invaded zone
Rm	Resistivity of the mud
Rmf	Resistivity of the mud filtrates
Rmc	Resistivity of the mud cake
Rw	Resistivity of the formation water
Rwa	Apparent resistivity of the formation water
Rt	Resistivity of the formation
Rxo	Resistivity of the flushed zone
Rsh	Resistivity of the shale
Sxo	Water saturation in flushed zone or invaded zone
Ri	Resistivity of invaded zone
Vsh	Volume of shale
Rmfeq	Equivalent mud filtrate resistivity
Rweq	Equivalent formation water resistivity
Essp	Estatic spontaneous potential
S_w	Saturation of water
S_h	Saturation of hydrocarbon
Ø	Porosity
BOEPD	Barrels of oil equivalent per day
CNL	Compensated Neutron Log
PEF	Photo-Electric Factor
LLS	Laterolog Shallow
LLD	Laterolog Deep
MSFL	Microsphericaly 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
Φav	Average Porosity
Φn	Neutron Porosity
Φden	Density Porosity
Ma	Million Years
Fm	Formation
GR_{log}	Gamma ray reading of formation
GR_{min}	Gamma ray minimum
GR_{max}	Gamma ray maximum (shale)
ρ_{ma}	Matrix density
ρ_b	formation bulk density
ρ_f	fluid density
F	formation factor ($a/Ø_A^m$)
A	turtuosity factor
M	constant, cementation exponent
K-10	Kadanwari well no 10
K-11	Kadanwari well no 11

CONTENTS

CHAPTER 4

PETROPHYSICAL ANALYSIS

FIGURES

TABLES

Graphs