

**SOURCE ROCK EVALUATION OF PATALA
FORMATION USING WIRELINE LOGS OF
WELL TURKWAL DEEP-01 UPPER INDUS BASIN,
PAKISTAN**



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A thesis submitted to Bahria University, Islamabad in partial fulfillment
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DEDICATION

We dedicate this research work to our parents who always loved and appreciated us. We thank them for providing us support and encouragement. We are also grateful to our teachers and class fellows who assisted, cooperated and guided us throughout our research work.

ABSTRACT

The purpose of this research is to evaluate source rock potential of Patala Formation using wireline log data of well Turkwal deep-01. Geographically the study area lies in Chakwal district. Tectonically, the study area is a part of Southern Potwar Deformed Zone Potwar. The data comprised of Log suit of all the three basic logs. To achieve the objective, qualitative and quantitative analyses have been done. A probable source zone has been marked from 10584ft-10596ft on the basis of log response. In this zone Gamma ray is showing relatively high response. Patala Formation is comprised mainly of shale with some portion of limestone as indicated by the cross-plot between bulk density and neutron. Mineralogically the Patala Formation contains heavy thorium bearing mineral as indicated by the cross plot of thorium and potassium. Uranium, Thorium and potassium are also relatively high in this zone which indicates that lithology is shaly carbonate that contains organic matter and having reducing environment. The maturation of source rock is defined by the trend of LLD. LLD is not showing higher value of resistivity which is another indication of Hydrocarbon in that Zone. The important factor of source rock is its total organic content (TOC). The TOC calculated by density log comes out to be 0.025%. Passey's DlogR method is also applied for TOC calculation and it showed 0.07%. So the calculated value of TOC categorized Patala Formation acting as a poor source rock in the study area.

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CONTENTS

	Page
ABSTACT	i
ACKNOWLEDGEMENTS	ii
CONTENTS	iii
FIGURES	v
TABLES	vi
ABBREVIATIONS	vii

CHAPTER 1 INTRODUCTION

1.1	Introduction	1
1.2	Introduction to study area	1
1.3	Location and accessibility	2
1.4	Problem statement	2
1.5	Objectives	4
1.6	Data required	4
1.7	Methodology	4

CHAPTER 2 GEOLOGY AND TECTONICS

2.1	Regional tectonic settings	6
2.2	Regional tectonics of Potwar sub Basin	8
2.3	Generalized stratigraphy of Upper Indus Basin	12
2.4	Borehole stratigraphy	13
2.5	Petroleum play of Potwar Plateau	14
2.6	Petroleum prospect	15
2.7	Source rock	15
2.8	Generation and migration	17
2.9	Reservoir rocks	17
2.10	Traps and seals	18

2.11	Patala Formation	18
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CHAPTER 3

SOURCE ROCK EVALUATION

3.1	Source rock analysis	20
3.1.1	Qualitative analysis	20
3.1.1.1	Lithology identification	20
3.1.1.2	Mineralogical identification	22
3.2	Quantitative analysis	23
3.2.1	Visual analysis of logs	23
3.2.1.1	Identification of source zone	23
3.2.1.2	Indication of organic content	25
3.2.1.3	Maturation of source rock	27
3.2.1.4	Estimation of Total Organic Content	28
3.2.1.5	Sonic log	32
3.3	Passey's DlogR method	33
3.3.1	Passey's method	35
3.4	Vitrinite Reflectance	36
3.5	Wireline log analysis	37

RESULTS AND DISCUSSIONS	39
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CONCLUSIONS	41
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REFERENCES	42
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Appendix A	47
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FIGURES

	Page
Figure 1.1. Location map of well Turkwal Deep-01(Survey of Pakistan)	3
Figure 1.2. Flow chart for methodology of source rock evaluation	5
Figure 2.1. Formation of continents (USGS, 1994)	7
Figure 2.2. Tectonic map of Potwar sub Basin (Khan et al., 1986)	11
Figure 3.1. RHOB vs NPHI cross-plot for lithological identification.	21
Figure 3.2. Thorium vs Potassium cross-plot for mineralogical identification.	22
Figure 3.3. Trend of SGR in Patala Formation of well Turkwal deep-01	24
Figure 3.4. Uranium log trend in Patala Formation of well Turkwal deep-01.	25
Figure 3.5. Trend of deep resistivity log (LLD) in Patala Formation Turkwal deep-01	27
Figure 3.6. Trend of bulk density in Patala Formation of well Turkwal deep- 01.	29
Figure 3.7. Trend of sonic log in Patala Formation Turkwal deep-01	32
Figure 3.8. Image showing DlogR and baseline interval in well Turkwal deep-01.	34
Figure 3.9. Graph for finding level of maturity from vitrinite reflectance	37

TABLES

	Page
Table 1.1. Log suite of well Turkwal deep-01.	4
Table 2.1. Generalized stratigraphy of Upper Indus Basin.	12
Table 2.2. Borehole stratigraphy of well Turkwal deep-01.	13
Table 3.1. SGR interpretation for environment of deposition.	26
Table 3.2. Interpretation of SGR data.	26
Table 3.3. Source rock quality w.r.t. TOC range.	31
Table 3.4. Table showing maturity assessment from vitrinite reflectance.	37
Table 3.5. Cumulative result of TOC's for both zones along with Bulk density and Spectral Gamma ray	38

ABBREVIATIONS

OGDCL	Oil and Gas Development Company Limited
LMKR	Land Mark Resources
DGPC	Directorate General of Petroleum Concession
PEF	Photo-Electric Factor
LLS	Lateral Log Shallow
LLD	Lateral Log Deep
MSFL	Micro-Spherically Focused Log
SP	Spontaneous Potential
GR log	Gamma Ray Log
SGR log	Spectral Gamma Ray
CGR log	Composite Gamma Ray Log
ρ_{ma}	Density of Matrix
ρ_f	Density of Fluid
Sh	Saturation of hydrocarbons
Sw	Saturation of water
TOC	Total Organic Carbon
T.D	Total Depth
POL	Pakistan Oilfields Limited
DBT	Dhurnal Back Thrust
HKS	Hazara-Kashmir Syntaxes
KF	Kanet Fault
KMF	Khair-i-Murat Fault
MBT	Main Boundary Thrust
MMT	Main Mantle Thrust
NPDZ	Northern Potwar Deformed Zone
RF	Riwat Fault
SRT	Salt Range Thrust
SPDZ	Southern Potwar Deformed Zone