2D INTERPRETATION OF BADIN BLOCK, SOUTHERN INDUS BASIN



By

ZEESHAN AZEEM

Department of Earth and Environmental Sciences Bahria University, Islamabad

2012

CONTENTS

PageCONTENTSiFIGURESiiTABLESiiiGRAPHSviABSTRACTviiiACKNOWLEDGEMENTSix

CHAPTER 1

INTRODUCTION

1.1	Seismic study	2
1.2	Objective	2
1.3	Data for the research work	2
1.4	Base map of the study area	3

CHAPTER 2

GEOLOGY

2.1	Structural setting	5
2.2	Stratigraphy	5
2.3	Lithological description	6
2.3.1	Khadro Formation	6
2.3.2	Upper Ranikot	6
2.3.3	Lower Ranikot	6
2.3.4	Parh Limestone	7
2.3.5	Goru Formation	7
2.3.6	Kirthar Formation	7

CHAPTER 3

TECTONICS

3.1	Jurassic sequence in Southern Indus basin	9
3.2	Cretaceous sequence in Southern Indus basin	9
3.3	Paleocene sequence in Southern Indus basin	9

CHAPTER 4

SEISMIC DATA INTERPRETATION

4.1	Well to seismic tie	12
4.1.1	Synthetic seismogram	12
4.1.2	Picking of reflector	12
4.1.3	Fault identification	13

CHAPTER 5

TIME AND DEPTH CONTOUR MAPS

5.1	Time contour maps	27
5.1.1	Tectonic environment	27
5.1.2	Faults correlation	27
5.1.3	Structure	27
5.2	Velocity graph	32
5.2.1	PK86-1202	32
5.2.2	PK85-960	33
5.2.3	PK86-1200	34
5.2.4	PK85-964	35
5.2.5	PK85-935	36

		Page
5.2.6	PK85-958	37
5.3	Depth contour maps	39

CHAPTER 6

LOG CORRELATION

6.1	Method	44

CHAPTER 7

ATTRIBUTE ANALYSIS

7.1	Amplitude	49
7.1.1	Total amplitude maps	50
7.1.2	Maximum peak amplitude maps	53
7.1.3	Average peak amplitude maps	55
CONCLUSIONS		57
RECOMMENDATIONS		58
REFERENCES		59
WEB LINKS		60

FIGURES

		Page
Figure1.1.	Petroleum activity map with highlighted study area (LMKR,	
	2012).	1
Figure 1.2.	Base map of the study area.	3
Figure 2.1.	Generalized stratigraphic chart of Southern Indus basin	
	(Kadri, 1995).	5
Figure 3.1.	Map of Pakistan showing division of Indus basin	
	(Quadri et al., 1986)	10
Figure 4.1.	Synthetic seismogram used for horizon identification.	13
Figure 4.2.	Seismic section with marked horizons and faults (PK85-1200).	14
Figure 4.3.	Seismic section with highlighted horizons (PK85-1200).	15
Figure 4.4.	PK85-1202 with marked horizons and faults.	16
Figure 4.5.	PK85-1202 with highlighted horizons.	17
Figure 4.6.	Seismic section of line PK85-960 with marked horizon	
	and faults.	18
Figure 4.7.	Seismic section of line PK85-960 with horizons highlighted.	19
Figure 4.8.	Seismic section of line PK85-958 with horizons highlighted.	20
Figure 4.9.	Seismic section of line PK85-958 with horizons highlighted.	21
Figure 4.10.	Seismic section of line PK85-964.	22
Figure 4.11.	Seismic section of line PK85-964.	23
Figure 4.12.	Seismic section of line PK85-935.	24
Figure 4.13.	Seismic section of line PK85-935.	25
Figure 5.1.	Time contour map of top Lower Goru.	28
Figure 5.2.	Time contour map of top Lower Goru.	29
Figure 5.3.	Time contour map of C-sand.	30
Figure 5.4.	Time contour map of C-sand.	31
Figure 5.5.	Depth contour map of top Lower Goru.	40
Figure 5.6.	Depth contour map of top Lower Goru.	41
Figure 5.7.	Depth contour map of C-sand.	42
Figure 5.8.	Depth contour map of C-sand.	43

		Page
Figure 6.1.	Correlation of Jabo-01 &03 at 1:10000 Scale.	44
Figure 6.2.	Correlation of Kirthar Formation and Upper Ranikot at 1:500	
	scale.	45
Figure 6.3.	Correlation of Khadro and Lower Ranikot at 1:500 scale.	46
Figure 6.4.	Correlation of Parh limestone, Upper and Lower Goru at 1:500	
	scale.	47
Figure 6.5.	Absence of Badin shale and C-sand in Jab0-03 well at 1:500	
	scale.	48
Figure 7.1.	Different types of well symbols (Robison, 2010).	50
Figure 7.2.	Total amplitude map of top Lower Goru.	51
Figure 7.3.	Total amplitude map of C-sand.	52
Figure 7.4.	Maximum amplitude map of top Lower Goru.	53
Figure 7.5.	Maximum amplitude map of C-sand.	54
Figure 7.6.	Average amplitude map of top Lower Goru.	55
Figure 7.7.	Average amplitude map of C-sand.	56

TABLES

Table 2.1.	Stratigraphic section of Jabo-01 well adopted from well data.	Page 8
Table 5.1.	Velocities taken from velocity windows of line PK86-1202.	32
Table 5.2.	Velocities taken from velocity windows of line PK85-960.	33
Table 5.3.	Velocities taken from velocity windows of line PK86-1200.	34
Table 5.4.	Velocities taken from velocity windows of line PK85-964.	35
Table 5.5.	Velocities taken from velocity windows of line PK85-935.	36
Table 5.6.	Velocities taken from velocity windows of line PK85-958.	37

GRAPHS

		Page
Graph 5.1.	Trend of the velocities plotted against time.	33
Graph 5.2.	Trend of the velocities plotted against time.	34
Graph 5.3.	Trend of the velocities plotted against time.	35
Graph 5.4.	Trend of the velocities plotted against time.	36
Graph 5.5.	Trend of the velocities plotted against time.	37
Graph 5.6.	Trend of the velocities plotted against time.	38

ABSTRACT

The thesis deals with the 2D-seismic reflection data. The data is given by the LMKR (Landmark Resources) by the authorization of Directorate General of Petroleum Concession (DGPC). The seismic sections having line numbers PK86-1200, PK86-1202, PK85-960, PK85-958, PK85-964, are dip lines shot in east-west. The remaining line PK85-35 is strike line shot in North-South direction. Root mean square is also computed during processing are also provide with the seismic section at selected CDP'S and are used for the calculation of average velocities to convert the given time into depth.

Kirthar, Khadro, Parh, top Lower Goru and C-sand are the noticeable reflectors on the seismic section. Time contour map of top Lower Goru (TLG) and C-sand are prepared and depth contour map are also drawn by using velocity and one-way travel time. Normal faulting exists in the area. Horst and Graben structures are observed in the area. Amplitude maps are made which suggest probable presence of hydrocarbons at the well location.

ACKNOWLEDGMENTS

I would like to thank my supervisor Mr. Yasir Zeb, Senior Geophysicist (Dewan Petroleum Limited) and my co-supervisor Mr. Amir Malik, Geophysicist (LMKR) for their guidance, encouragement and advice they had provided throughout my time as their student.

I offer my gratitude to the members of Thesis Evaluation Committee Prof. Dr. Tahseenullah Khan, Earth and Environmental Sciences, Bahria University for the critical review of the thesis and Mr. Anwar Qadir, Assistant Professor of Department of Earth and Environmental Sciences, Bahria University, for the review of the initial draft of the thesis.

I would thank to all the faculty members of the Department of Earth and Environmental Sciences, Bahria University and to my parents for their prayers and encouragement during my whole studies.