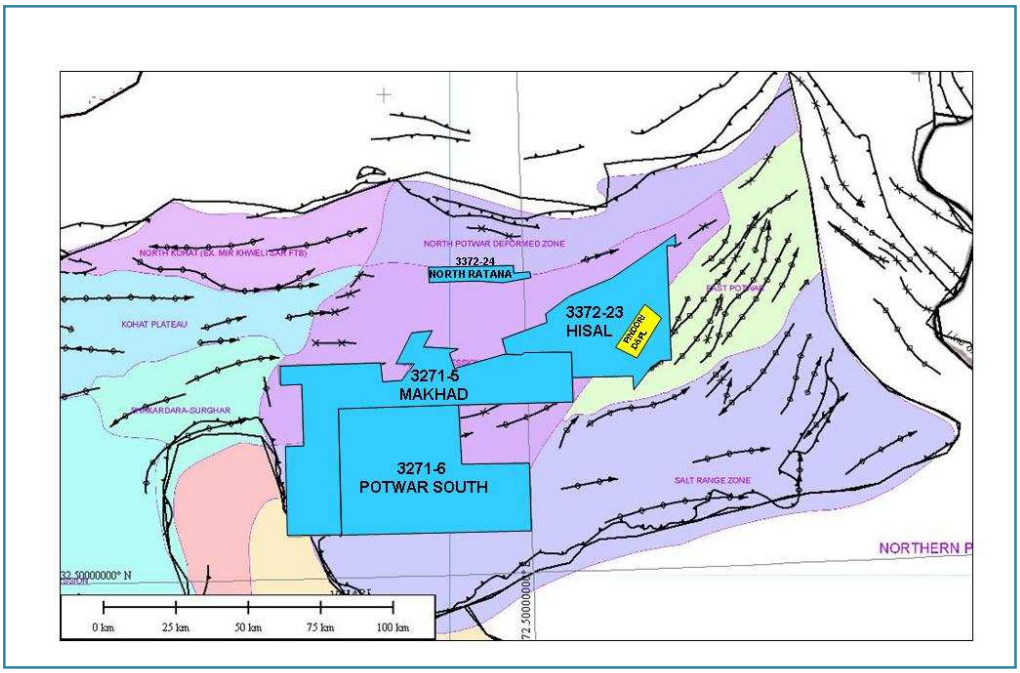
KOHAT-POTWAR FOLD BELT BASIN

INTRODUCTION

The North Ratana, Hisal, Makhad and Potwar South blocks are located in the Kohat-Potwar tectono-stratigraphic province of Indus Basin in northern part of Punjab province.



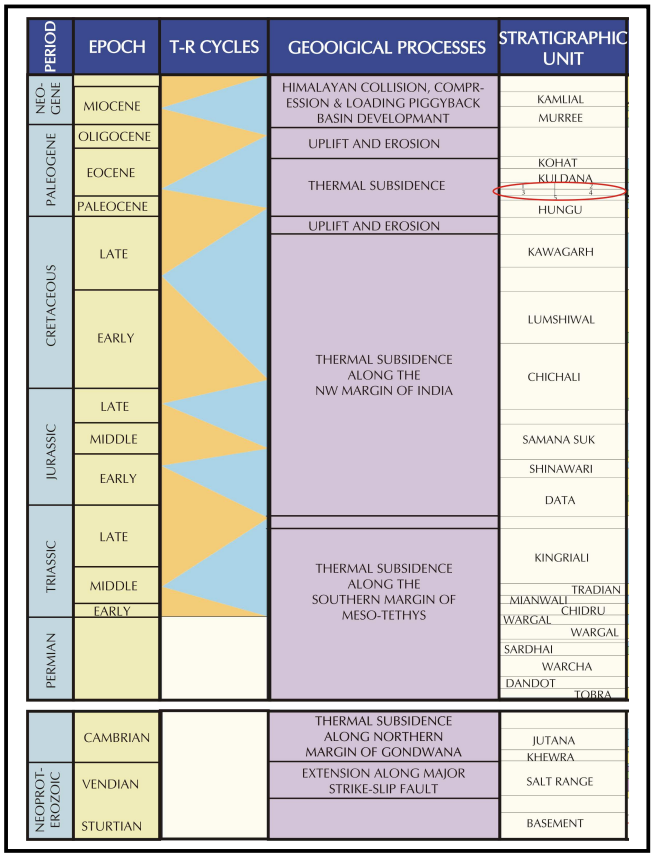
GEOLOGICAL SETTING

The Kohat-Potwar Foldbelt, on the northwest margin of the Indian Plate, is a structurally defined petroliferous region. The major structural divisions to the Kohat-Potwar Foldbelt are the North Potwar Deformed Zone, the Soan Syncline, the Salt Range, the Kohat Plateau, the Bannu Sub-basin and the Trans-Indus Ranges. The Main Boundary Thrust (MBT), together with parallel component faults, forms the boundary between the Potwar Plateau and the Parachinar-Kala Chitta Foldbelt to the north. The sinistral Jhelum Fault separates the Potwar Plateau and the Salt Range from the Hazara-Kashmir Syntaxis to the east. The Salt Range Thrust marks the southern boundary. The Trans-Indus Ranges form the eastern and southern boundaries.

There are also important structural sub-divisions caused by internal stratigraphic divisions (related to occurrence of salt) and possibly by previous structural events (e.g. extensional events of Precambrian age possibly affecting the basement).

STRATIGRAPHY

Depositional history of the Kohat-Potwar Foldbelt goes back to Precambrian by the deposition of Salt Range Formation and sediments of Jehlum Group in a sag basin. Upper Cambrian, Ordovician, Silurian, Devonian or Carboniferous sediments are not present in the basin due to non-deposition and/or erosion. Lower Permian strata unconformably overlie Precambrian and Cambrian strata in Kohat-Potwar Foldbelt. Mesozoic strata overlying the Permian are incomplete and interrupted by several disconformities in the foldbelt. Late Cretaceous to Paleocene tilting, uplift and erosion event, represented by a major unconformity at the base of the Paleocene section, was responsible for the partial to complete removal of the Upper Permian to Mesozoic section in the east. Sedimentation on passive margin of the Indian Plate was resumed in the Paleocene with the deposition of the clastics of Hangu Formation. The Lower to Middle Eocene shallow marine and lagoonal strata are the last marine deposits in the Kohat-Potwar Foldbelt. A major unconformity separates the continental Neogene deposits from the underlying, Palaeogene strata. No Oligocene sediments are present in the basin. Deposition resumed in the Early Miocene with the deposition of molasse, unconformably over Eocene in the foreland basin until Pliocene.



PETROLEUM GEOLOGY

Kohat-Potwar foldbelt is a prolific hydrocarbon province and have many proven petroleum systems.

SOURCE ROCKS

Source rock data indicates that good oil-prone source potential exists in the Infra-Cambrian sediments of the Kohat-Potwar Basin with total organic carbon contents (TOC) ranging from 3.75% to 30%. Source potential, mainly for gas, is present in Permian sediments with TOC up to 6%. Paleocene sediments show oil and gas potential in the Kohat-Potwar Basin. TOC in the Palaeocene (Patala) source rock ranges up to 10.73% with good hydrocarbon potential. The coal and coaly shales in Patala Formation also exhibit good source potential.

RESERVOIR ROCKS

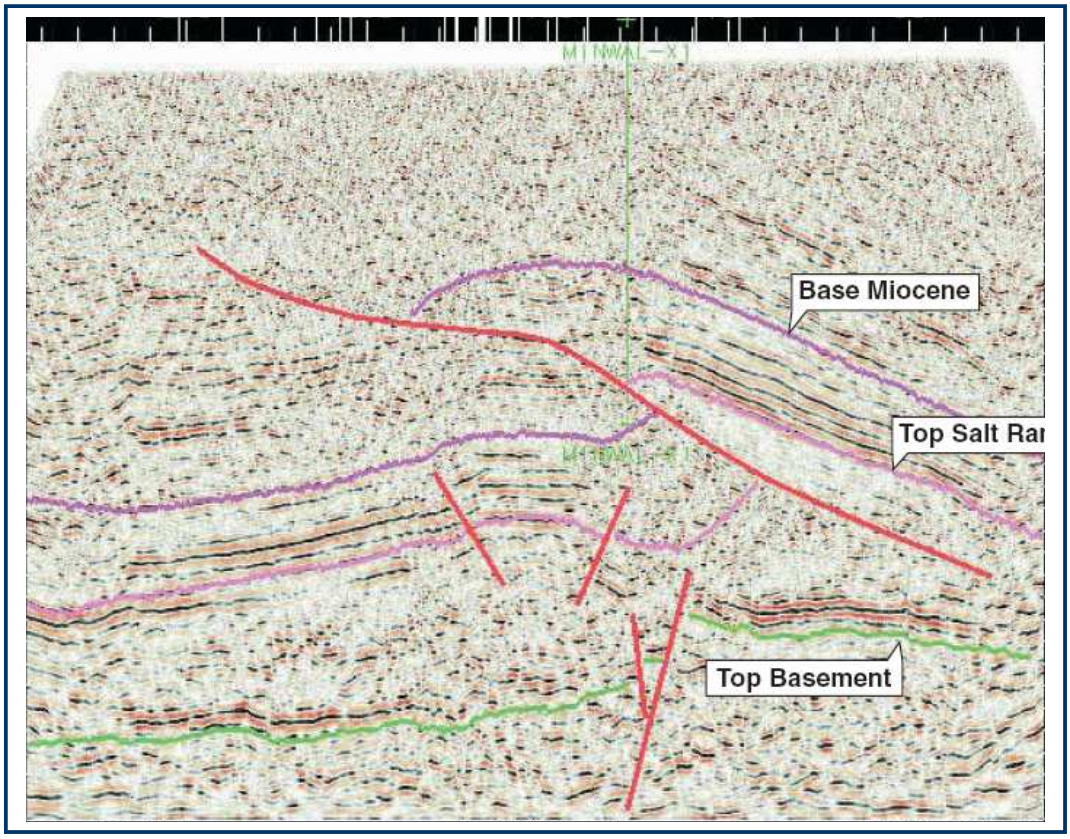
Petroleum plays with reservoirs ranging in age from Infra-Cambrian to Miocene are present in the Kohat-Potwar Foldbelt. The target reservoirs are clastics and carbonates of Infra-Cambrian, Lower Cambrian, clastics of Permian, clastics and carbonates of Lower to Middle Jurassic, clastics of Lower Cretaceous, carbonates of Upper Paleocene and Lower Eocene and clastics of Miocene.

SEAL ROCKS

Thick layers of evaporites and shale have good sealing potential for Infra-Cambrian reservoir. Interbedded shale, siltstone and mudstone provide seal to Cambrian reservoirs. Limestone and intraformational shale are the potential seals for Mesozoic and Cenozoic reservoirs. Paleocene shales (Patala Formation) and Miocene shale are the regional seals in the area.

TRAPPING MECHANISM

Both structural and statigraphic traps are possible in the Kohat-Potwar. Eastern Potwar represents, thrusted and salt cored anticlines and local pop ups. While the Salt Range Zone exhibits thrusted anticlines. Northern Potwar represents Passive Roof Duplex geometry, where thrusted anticlines are the potential targets. Further north in the North Potwar Deformed Zone imbricated antiformal stacks are the main targets. The Kohat area has experienced very complex deformation style due to the development of multiple detachment levels, and compression as well as strike slip motion. The area is represented by antiformal stack and possibly flower structures, thrusted anticlines and pop-up, fault propagating folds etc. The Cretaceous and Jurassic truncations, thrusted anticlines and gentle fold could be the potential targets in Bannu Area.



Structural Style in the Kohat-Potwar Foldbelt Basin

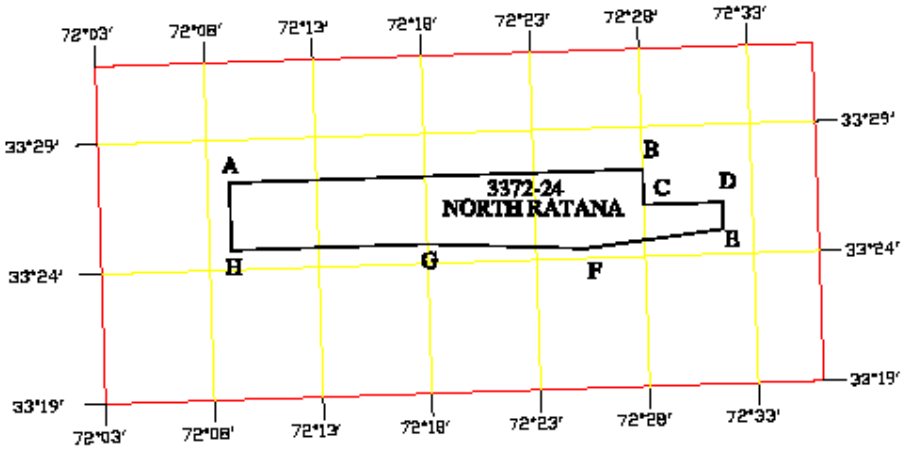
KOHAT POTWAR FOLDBELT BASIN
CO-ORDINATES FOR NEW BLOCKS

VERTICES	LONG_DMS	LAT_DMS	BLOCK NAME	AREA COVERED
A	71□36' 22"	32º 38' 00"	3271-5 MAKHAD	2357.14 Sq.Kms
B	71□36' 22"	32º 55' 00"		
C	71□40' 00"	32º 55' 00"		
D	71□40' 00"	33º 06' 30"		
E	71□35' 00"	33º 06' 30"		
F	71□35' 00"	33º 10' 00"		
G	71□57' 48"	33º 10' 00"		
H	71□57' 48"	33º 06' 31"		
I	72□02' 9"	33º 06' 31"		
J	72□2' 30"	33º 07' 00"		
K	72□4' 56.16"	33º 10' 00"		
L	72□1' 26"	33º 10' 00"		
M	72□4' 58"	33º 15' 35"		
N	72□9' 32"	33º 15' 42"		
O	72□7' 22.5"	33º 12' 45"		
P	72□14' 31.65"	33º 12' 19.85"		
Q	72□14' 40.52"	33º 11' 52.16"		
R	72□13' 9.64"	33º 11' 31.78"		
S	72□14' 10.1"	33º 08' 22.92"		
T	72□25' 37.03"	33º 10' 58.93"		
U	72□40' 18"	33º 10' 58.95"		
V	72□40' 18"	33º 01' 36"		
W	71 48' 00"	33º 01' 36"		
X	71 48' 00"	32º 38' 00"		
A	71 36' 22"	32º 38' 00"		

VERTICES	LONG_DMS	LAT_DMS	BLOCK NAME	AREA COVERED
A	71 48' 00"	32 38' 00"	3271-6 POTWAR SOUTH	2412.56 Sq.Kms
B	71 48' 00"	33 1' 36"		
C	72 15' 00"	33 1' 36"		
D	72 15' 00"	32 50' 31.2"		
E	72 30' 00"	32 50' 31.2"		
F	72 30' 00"	32 38' 00"		
A	71□48' 00"	32□38' 00"		

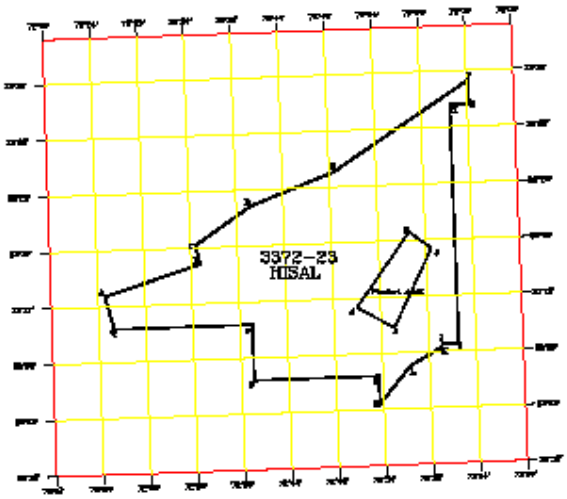
VERTICES	LONG_DMS	LAT_DMS	BLOCK NAME	AREA COVERED
A	72□24' 40.26"	33□13' 54"	3372-23 HISAL	1505.59 Sq.Kms
B	72□35' 00"	33□16' 33"		
C	72□34' 30"	33□18' 12"		
D	72□40' 34"	33□21' 35"		
E	72□49' 30"	33□24' 21"		
F	73□04' 12"	33□32' 7"		
G	73□04' 12"	33□30' 00"		
H	73□02' 08"	33□30' 00"		
I	73□02' 08"	33□08' 40"		
J	73□00' 26"	33□08' 40"		
K	73□00' 16.41"	33□08' 21.65"		
L	72□56' 56"	33□06' 48"		
M	72□53' 33"	33□03' 31"		
N	72□53' 33"	33□06' 00"		
O	72□40' 17.81"	33□06' 00"		
P	72 40' 18"	33 10' 58.95"		
Q	72 25' 37.03"	33 10' 58.93"		
A	72 24' 40.26"	33 13' 54"		

VERTICES	LONG_DMS	LAT_DMS	BLOCK NAME	AREA COVERED
A	72 09' 00"	33 27' 22"	3372-24 NORTH RATANA	162.63 Sq.Kms
B	72 28' 00"	33 27' 22"		
C	72 28' 00"	33 26' 00"		
D	72 31' 37"	33 26' 00"		
E	72 31' 37"	33 24' 58"		
F	72 25' 14.7"	33 24' 23.78"		
G	72 18' 00"	33 24' 46"		
H	72 09' 00"	33 24' 46.21"		
A	72 09' 00"	33 27' 22.23"		



	3372-24			NORTH RATANA		
A	33	27	22. 00	72	09	00. 00
B	33	27	22. 00	72	28	00. 00
C	33	26	00. 00	72	28	00. 00
D	33	26	00. 00	72	31	37. 00
E	33	24	58. 00	72	31	37. 00
F	33	24	23. 78	72	25	14. 70
G	33	24	46. 00	72	18	00. 00
H	33	24	46. 21	72	09	00. 00
A	33	27	22. 23	72	09	00. 00

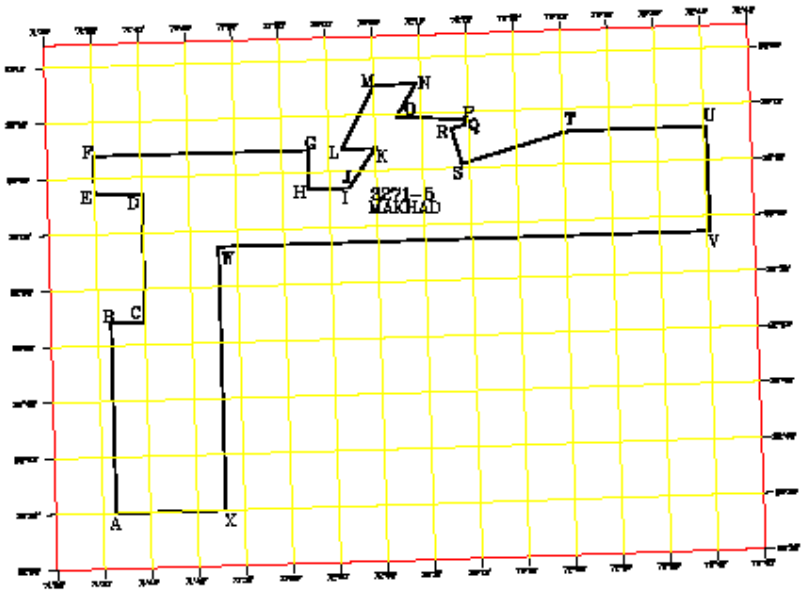
3372-24	NORTH RATANA
TOTAL AREA	162.63 Sq.Kms.
ZONE	I



HISAL			3372-23		
A	33	13 54. DD	72	24	40. 26
B	33	16 33. DD	72	35	DD. DD
C	33	18 12. DD	72	34	30. DD
D	33	21 35. DD	72	40	34. DD
E	33	24 21. DD	72	49	30. DD
F	33	32 07. DD	73	04	12. DD
G	33	30 00. DD	73	04	12. DD
H	33	30 00. DD	73	02	08. DD
I	33	08 40. DD	73	02	08. DD
J	33	08 40. DD	73	00	26. DD
K	33	08 21. 65	73	00	16. 41
L	33	06 48. DD	72	56	56. DD
M	33	03 31. DD	72	53	33. DD
N	33	06 00. DD	72	53	33. DD
O	33	06 00. DD	72	40	17. 81
P	33	10 58. 95	72	40	18. DD
Q	33	10 58. 93	72	25	37. 03
A	33	13 54. DD	72	24	40. 26

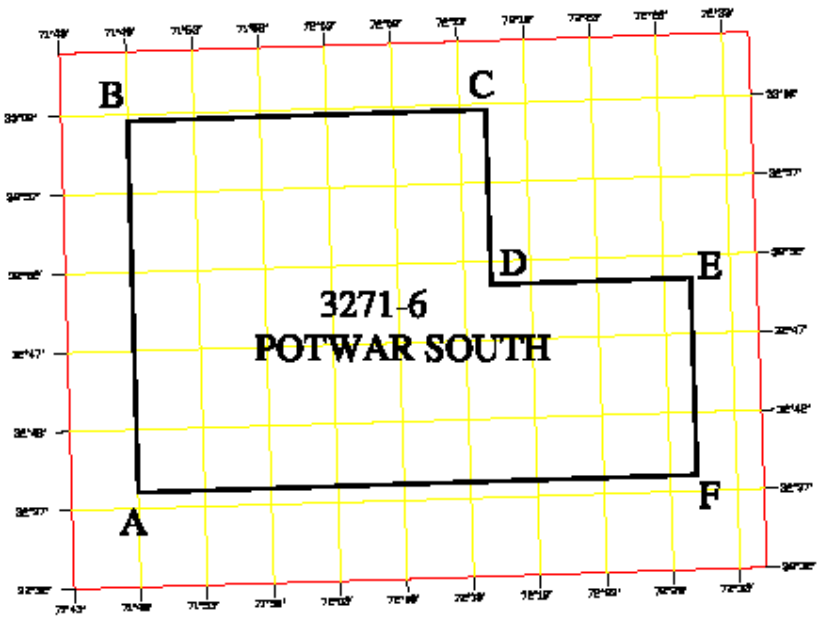
Pindori D&PL Area = 66.58 Sq. Kms.		
A	33 12 00.00	72 61 27.59
B	33 12 46.09	72 57 12.60
C	32 17 14.95	72 59 36.93
D	33 19 16.64	72 65 22.92

HISAL	3372-23
TOTAL AREA	1503.59 Sq.Kms.
EXCLUDING AREA	66.58 Sq.Kms.
APPLIED AREA	1419.01 Sq.Kms.
ZONE	I



	MAKHAD				3271-5			
A	32	38	00.	00	71	36	22.	00
B	32	55	00.	00	71	36	22.	00
C	32	55	00.	00	71	40	00.	00
D	33	06	30.	00	71	40	00.	00
E	33	06	30.	00	71	35	00.	00
F	33	10	00.	00	71	35	00.	00
G	33	10	00.	00	71	57	48.	00
H	33	06	31.	00	71	57	48.	00
I	33	06	31.	00	72	02	09.	00
J	33	07	00.	00	72	02	30.	00
K	33	10	00.	00	72	04	56.	16
L	33	10	00.	00	72	01	26.	00
M	33	15	35.	00	72	04	58.	00
N	33	15	42.	00	72	09	32.	00
O	33	12	45.	00	72	07	22.	50
P	33	12	19.	85	72	14	31.	65
Q	33	11	52.	16	72	14	40.	52
R	33	11	31.	78	72	13	09.	64
S	33	08	22.	92	72	14	10.	10
T	33	10	58.	93	72	25	37.	03
U	33	10	58.	95	72	40	18.	00
V	33	01	36.	00	72	40	18.	00
W	33	01	36.	00	71	48	00.	00
X	32	38	00.	00	71	48	00.	00
A	32	38	00.	00	71	36	22.	00

MAKHAD	3271-5
TOTAL AREA	2357.14 Sq.Kms
ZONE	I



POTWAR SOUTH							
A	32	38	00. 00	71	48	00. 00
B	33	01	36. 00	71	48	00. 00
C	33	01	36. 00	72	15	00. 00
D	32	50	31. 20	72	15	00. 00
E	32	50	31. 20	72	30	00. 00
F	32	38	00. 00	72	30	00. 00
A	32	38	00. 00	71	48	00. 00

3271-6	POTWAR SOUTH
TOTAL AREA	2412.56 Sq.Kms.
ZONE	I