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## STRATIGRAPHY OF JAISALMER BASIN, RAJASTHAN

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## ABSTRACT

Jaisalmer basin in an integral part of a major tectonic province known as "West Rajasthan Shelf" which is located to the west of Aravalli ranges and represents the eastern shelf part of the Indus basin. The shelf is carved out into a number of sedimentary basins viz. Jaisalmer, Bikaner- Nagaur and Barmer. Jaisalmer basin has well documented history for Paleozoic, Mesozoic and Cenozoic rock sequences and occupies an area of 42000 sq. km.. An exhaustive study of the surface and subsurface sedimentary sequences has been possible in this basin due to availability of voluminous subsurface data generated through drilling in course of oil exploration by ONGC. Tectonically this entire basin is divisible into four geotectonic blocks which from north to south are Kishangarh sub-basin Jaisalmer - Mari High, Shahgarh sub-basin and Miajlar sub-basin (Fig-1).

Jaisalmer basin is a pericratonic basin and represents mainly the westerly dipping eastern flank of the Indus Shelf. Structural style of the basin has been controlled by master faults. Existence of strike slip regime with its complimentary structural styles governing sedimentation history has been noticed in the basin. Its maximum effect is limited between Ramgarh and Kanoi master faults which are very extensive and can be traced from outcrop to subsurface. Tectonic map of Jaisalmer indicates an arcuate belt of north east-south west striking Mesozoic and Tertiary sequences. The general dips of outcropping formations are gentle to flat with minor system of enechelon and oblique faults. The explored area of this basin constitutes a dip slope at the rate of 3° to 5°. The structural trends in Jaisalmer basin are mainly NNW-SSE or NW-SE corresponding to Dharwarian trend alongwith NE-SW trending aravalli ranges. Jaisalmer-Mari High is not a simple upwarp in basement affecting overlying sediments. This high is present day gravity high feature located along the shoulder zone of Kanoi fault and is attributed to a upthrusting and wrench faulting. It is rather a zone of lifted fault blocks. Its western flank is down faulted to the south west along a series of trending en-echelon step faults. Shahgarh sub-basin is deepest depression and is less disturbed having NNE-SSE trending faults, while structurally simpler Miajlar sub-basin is located in southern extremity of the basin.

Jaisalmer basin experienced first sedimentation on igneous/metamorphic basement during Upper Paleozoic period and constitutes huge sedimentary thickness of the order of 10,000 meters or so which continued up till Recent. However, on southern extremely of the basin, formations of Proterozoic to Early Cambrian age are exposed, which are expected to continue in Miajlar sub-basin but this area has not been drilled so far. Lithostratigraphic units of Jaisalmer basin are well exposed in eastern extremely of the basin between Ramgarh, Kuri and Lathi. The maximum development of lithofacies is observed in deeper parts of the basin but some of these do not extend to surface. Tertiary stratigraphy of exposed and subsurface sequences was adequately revised and standardized by the author (Singh, 1984). Subsequently, author also presented the updated Mesozoic-Tertiary stratigraphy of the basin while discussing its biostratigraphy in detail (Singh, 1996). The stratigraphic column of sedimentary sequences of Mesozoic and Tertiary formations alongwith their thicknesses, age and brief lithology is given in figure-2.

Regional Stratigraphy of the basin has been worked out in accordance with the guidelines given in International sub-commission of stratigraphic classification (1976). In establishing the stratigraphy of Jaisalmer basin, a persistent problem has been faced in formalising the stratotype of a particular formation. Most of the authors have discussed distribution of the formation rather than indicating a type section of definite locality. Consequently, complete section of a formation is not available at one place. In such circumstances, the concept of type locality is invoked and essentially such type localities were taken into consideration where lower and upper boundaries could be marked (boundary stratotypes). Three major unconformities have been mapped in the basin, which differentiate four main sequences belonging to Proterozoic-Early Cambrian, Paleozoic-Mesozoic, Tertiary and Quaternary. In all, fifteen formations have been mapped in the basin out of which three formations namely Bhuana, Goru and Parh do not extend to the surface. Similarly Habur Formation is restricted to outcropping area except in subsurface of Bhuana area. Nonextension of marine Paleocene on surface, facies changes in basin ward areas additional development of a few members of the formations, condensation and extreme thinning of certain formations in shoreward areas have been observed. The surface and subsurface sedimentary sequences could be tied up precisely based on adequate biostratigraphic control and stratigraphy has bee standardised.

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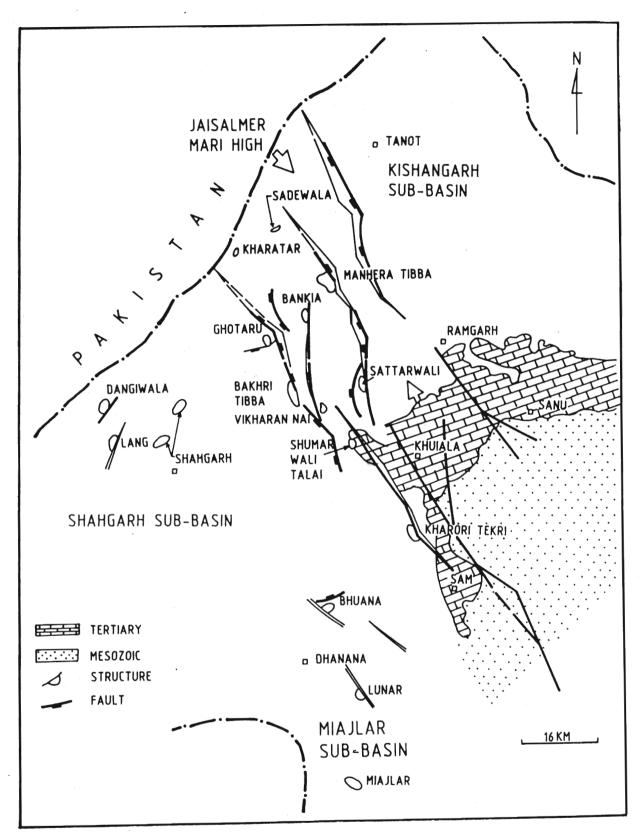


FIG. 1: LOCATION MAP OF JAISALMER BASIN

	AGE	FORMATION	MEMBER	MAXIMUM THICKNESS (M)	1	ITHO LOG	LITHOLOGICAL DESCRIPTION	MICROFAUNA/ PALYNOFLORA	REMARKS
	QUATERNARY			730		1-1-1 1-1-1	EOLIAN SAND WITH STREAKS OF ARGILLACEOUS, CALCAREOUS SANDSTONE, INTERCALATED LIMESTONE AND VARIEGATED CLAY, SANDSTONE (IN LOWER PART), MEDIUM TO COARSE, GRITTY AND FERRUGINOUS.	NO MICROFAUNA	
Z W	MIOUPP.	BANDAH	BT BW	200	500		ALTERNATIONS OF GREY SHALE AND GREY TO GREENISH GREY ARGILLACEOUS, FORAMINIFERAL LIMESTONE.	HETEROSTEGINA Spp. PELLATISPIRA Sp. N. ACUTUS, GL. KUGLERI F. ELLIPTICA.	BATREWALA =HABIB. RAHI
EOCE	YDOFSIAN	KHUIALA	TK FR AS TIK	400			SHALE GREENISH GREY, MICACEOUS, FISSILE WITH INTERCALATED LIMESTONE, IN LOWER PART LIMESTONE, BIOCLASTIC WITH INTERBEDS OF SHALE.	N. BURDIGALENSIS ASSILINA DAVIESI	KHINSAR + SIRHERA =GHAZIJ TE-TAKKAR
PALEOCENE	- THANE	D N V	KHARA	[0,0	1000		ALTERNATIONS OF SAND, MARL AND ARGILLACEOUS LIMESTONE AND GLAUCONITIC SAND AT BASE.  SANDSTONE, MEDIUM TO COARSE, FRIABLE; AT PLACES	MR. VELASCOENSIS PL. PSEUDOMENARDII ASSILINA DANDOTICA	=DUNGHAN
PAL		S	MAD MAD DHAN			***************************************	GLAUCONITIC WITH SHALE AT BASE.	NO MICROFAUNA	SEISMIC
1 1	TURO - CONIAC	PARH		350	0		INTER BEDS OF GREY TO GREENISH GREY LIMESTONE, MARL AND GREENISH GREY SILTY, FEEBLY CALCAREOUS SHALE.	M. SCHNEEGANSI M. SIGALI M. CORONATA M. HELVITICA	HORIZONE
	7 3		UPPER		1500	~~~~	MAINLY GREENISH GREY TO GREY FEEBLY CALCAREOUS, PYRITIC SHALE AT PLACES SILTY, MARL BED TOWARDS TOP.	ROTALIPORA CUSHMANI THOMASINELLA PUNICA	HORIZONE
A	APT-AIR CFNO	10	LOWER UP	565	2000		ALTERNATIONS OF LIGHT GREY, FINE GRAINED GLAUCONITIC SANDSTONE AND GREY SHALE, TOWARDS BOTTOM SHALE IS GLAUCONITIC.	H. WASHITENSIS PLANOMALINA BUXTORFI TICINELLA ROBERTI EPISTOMINA GR. COLOMI E. GR. CHARLOTTAE	SEISMIC
2	7 Z	PARIWAR		670	2500 20		DOMINANTLY SANDSTONE, MEDIUM TO FINE, COMPACT, AT PLACES COARSE GRAINED AND FRIABLE, INTERBEDS OF GREY, CARBONACEOUS SHALE ARE COMMON, OCCASIONALLY LIGHTE PRESENT.	BARREN ZONE  -SPIRBPLECTAMINA ct. DOR  HAPLO. ct. EXCAVATA  VAR. UMBLICATA  EPISTOMINA TENUICOSTA	HORIZONE
	KIMMERIDG-TITHONIAN	BAISAKHI-BHADASAR		730			ALTERNATIONS OF FINE, DIRTY WHITE TO LIGHT GREY, FEEBLY CALCAREOUS AND PYRITIC SANDSTONE AND DARK CARBONACEOUS SHALE, AT PLACES SHALE IS SILTY AND PYRITIC. BASE IS MARKED BY BROWNISH GREY GLAUCONITIC SHALE.	← TROCHAMMINA ROSACEA TROCHAMMINA NITIDA TROCHAMMINA SQUAMMI HAPLO. CF. VOLGENSIS.	
R A S S I	OXFORDIAN	T	FORT-BADABAG- KULDHAR		3500		DOMINANTLY BUFF TO GREY TIGHT LIMESTONE WHICH IS OOLITIC AT TOP. THIN INTERCALATIONS OF SHALE ARE COMMON	CONICO. BASILIENSIS TROCHOLINA CONOSIMILIS T. cf. TRANSVERSARII RICH PALYNOFOSSILS PRESENT. TEWARIA SP. WITH LONG RANGING FORAMINIFERA.	SEISMIC HORIZONE (J)
1-1	RATHO	\ \ \	HAM-JOYAN IRA				MAINLY DIRTY WHITE CALCAREOUS SANDSTONE AND INTERCALATED SHALE WITH OCCASIONAL BANDS OF LIMESTONE.		
	LOWER	LATHI		+600	000		MAINLY SANDSTONE MEDIUM TO FINE, GREY TO DIRTY WHITE, AT PLACES CALCAREOUS, THIN INTERCALATIONS OF CHOCOLATE BROWN CLAYSTONE AND GREY SHALES. LIGNITE STREAKS.	ABUNDANT OCCURRENCE OF GLISCOPOLLIS Sp. CLASSOPOLLIS Spp.	SEISMIC
PERMO-	TRIASSIC	RHIIANA		725	5100 4500	7,	SANDSTONE, RED, DARK BROWN, PINK MEDIUM TO COARSE, NON CALCAREOUS, WITH INTERCALATIONS OF FERRUGINOUS CLAYSTONE.	TRIASSIC & PERMIAN PALYNOFOSSILS	HORIZONE (DCR)
PF	PRE- CAMBRIAN						PHYLLITE/SCHIST AND GRANITE.		
SANDSTONE  SILTSTONE  SILTSTONE									ALA (HINSAR (HINSAR T CORRELA- REFLECTOR,