

# **LITHOFACIES AND DEPOSITIONAL ENVIRONMENT OF OKHMINTAUNG FORMATION IN KYUNCHAUNG AREA, PAKOKKU DISTRICT, MAGWAY REGION, MYANMAR**

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## **Abstract**

The Kyun Chaung area is situated in Pakokku District, Magway Region in Central Myanmar. The study area is composed essentially of Cenozoic rock sequences of Lower Pegu Group (Oligocene – Miocene) and Irrawaddy Formation. The rock sequences of the Lower Pegu Group are Padaung Formation, Okhmintaung Formation, (Lower-Upper Oligocene). The detailed petrographic analysis is carried out for the sandstones of the Padaung and the Okhmintaung Formation to obtain the modal compositions of the rock units, diagenetic imprints and provenance study. From the petrographic analysis, sandstones of the Okhmintaung Formations can be regarded as lithic arkose in composition. According to the lithofacies analysis, at least five different lithofacies type can be recognized in Okhmintaung Formation. They are Sand-Mud interlayer facies, Bluish Grey Shale facies, Bioturbated Sandstone facies, Fossiliferous Sandstone facies, and Ripple Sandstone facies. The depositional pattern of Okhmintaung Formation shows a typical cyclic sedimentation pattern occurred in near shore environment. The main economic interest of the KyunChaung area is petroleum extraction from reservoir.

**Keywords:** Pegu Group, Okhmintaung Formation, lithofacies, depositional environment

## **Introduction**

The Kyun Chaung area is situated in Pakokku District, Magway Region in Central Myanmar. The vertical grid number is (69) to (74) and the horizontal grid number is (05) to (12) in one inch topographic map. Topographic map No is 84 K/16, Burma Survey Department. The study area lies between North Latitude 21° 9' 00" to 21° 11' 30" and East Longitude 94° 44' 30" to 94° 49' 00". The coverage of investigated area is (12) square miles; 4 miles in E-W direction and 3 miles in N-S direction. It consists of Kyun

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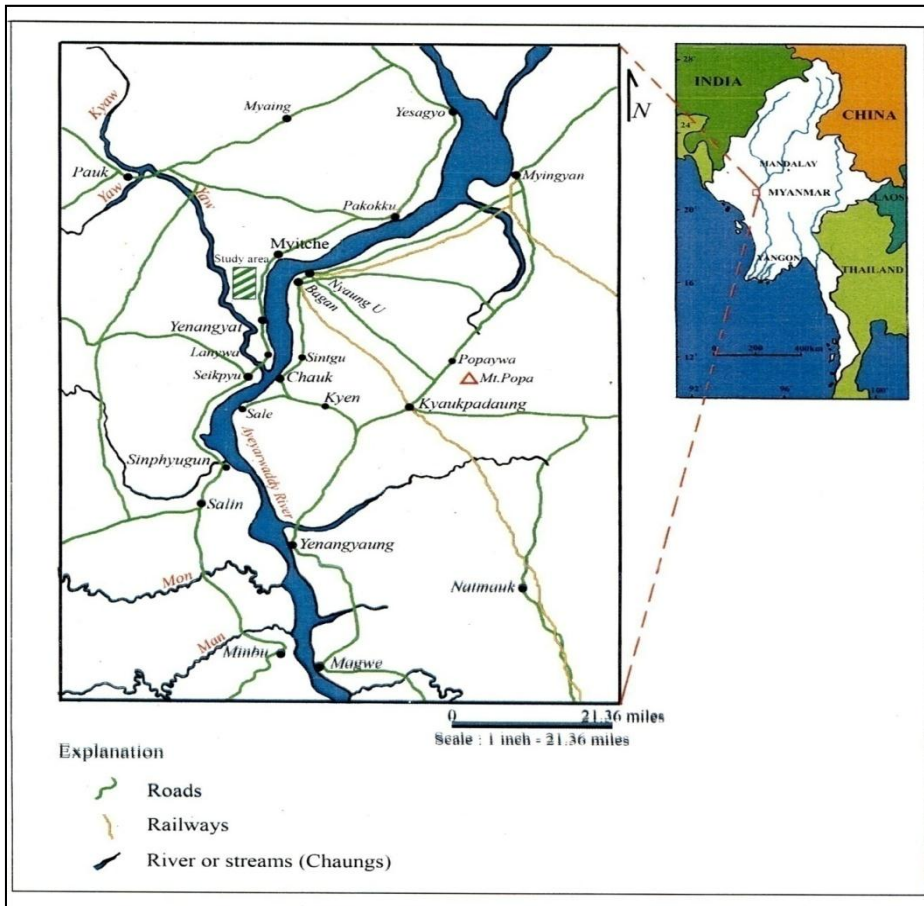
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Chaug, Letpangyaung, Myozo and Pauktaw villages. Location map of research area is as shown in figure (1).



**Figure 1:** Location map of the research area

### Methods of Investigation

- Provide Topographic map 84/K16 scale used for location and enlarge up to four times used as based field map.
- Detailed measurement of lithologic boundaries, thickness and dominant character of the rock unit.
- Good exposure views are obtained as a photographic data with facing.
- Compass can be used for finding the location and for measuring the dipping of the rock units.

### **Laboratory Methods**

- Firstly, according to the procedure of the defrosting, grinding of rock chips and gluing the use of Canada balsam are made.
- Compositions of rocks, grain size variation, physical and chemical character of sandstone (well cement) were studied.
- Taking photomicrographs of rock slides under the microscope.
- Writing up the detailed petrography of rock unit.

### **Regional Geological Setting**

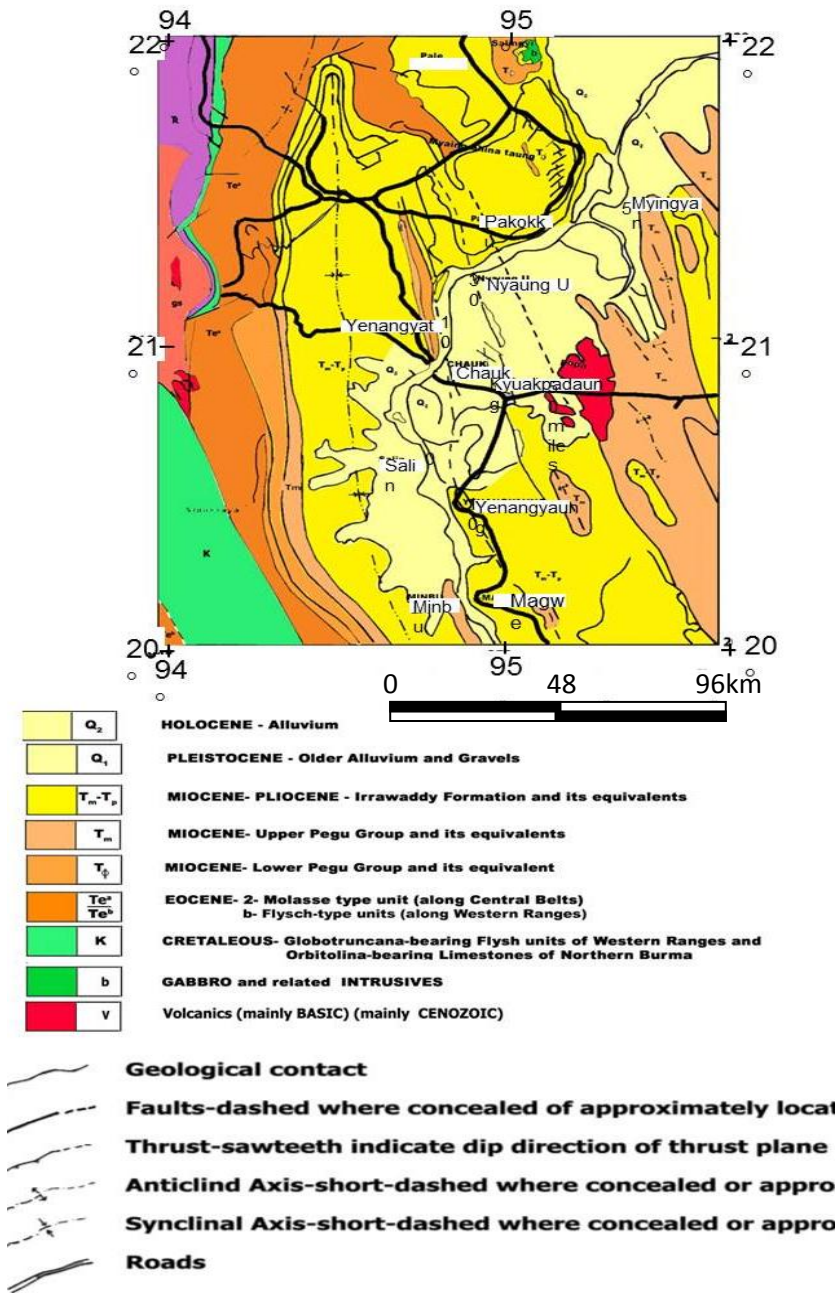
The research area lies within the Eastern Highland and the Western Ranges. It is rather interesting for the accumulation of oil and natural gas.

### **Regional Geology**

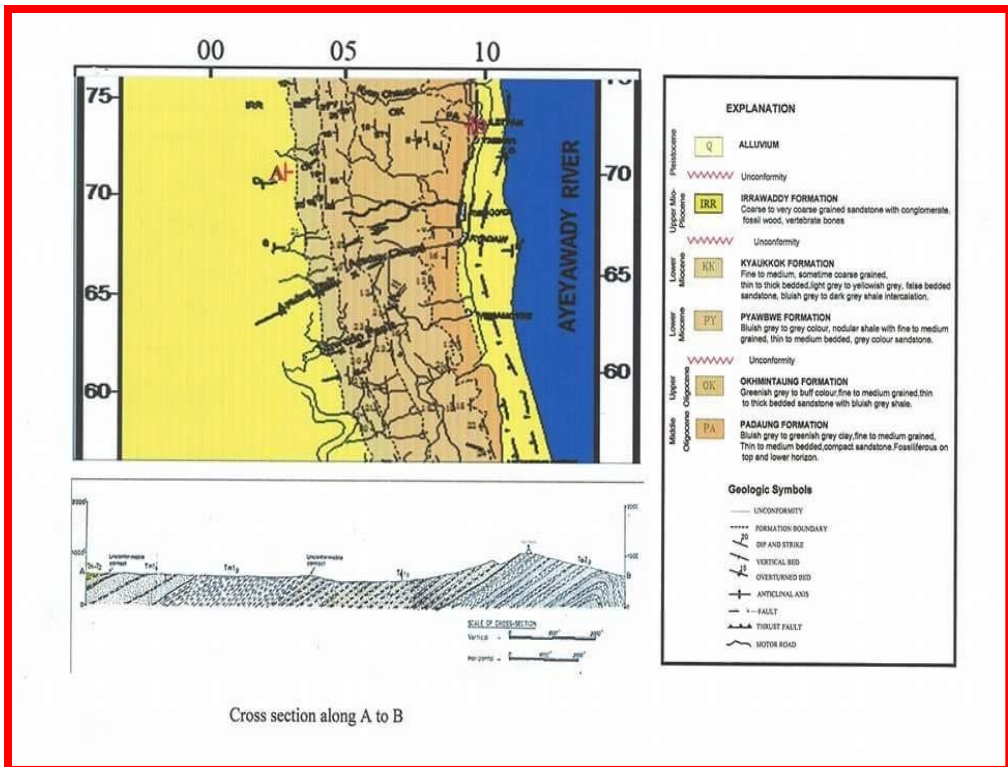
The present area is composed essentially of Cenozoic rock sequences of Lower Pegu Group (Oligocene-Miocene) and Irrawaddy Formation (Miocene-Pliocene). Regionally, in the southeast of the area mainly Cenozoic volcanic rock (Mt. Popa Volcano) is exposed. The rock sequences of the lower Pegu Group are Shwezetaung Formation, Padaung Formation, Okhmintaung Formation, (Lower-Upper Oligocene).

### **Regional Geological Structures**

Asymmetrical anticlinal fold is a prominent structure in this research area. It is a strongly asymmetry, steeply dipping east limb and gently dipping west limb. Dip amount of the eastern part is 68-70 and western part is 17-40. This anticline is Yenangyat-Chauk anticline. It is north plunging anticline. Yenangyat-Chauk thrust occurs in the eastern part of the research area. It extends nearly N-S position and down throw to the west. These structures are situated at the east of the Salin syncline in central basin. There are cross faults trending to NNE-SSW direction and early perpendicular to the strike of rock units.



**Figure 2:** Regional geological map of the research area (Modified after Million scaled Geological Map of Union of Myanmar, 1977)







**Figure 3:** Geological map of Kyun Chaung area (Modified after U Than Htut, MOGE, 1995)

## Stratigraphy

### General Description

The research area is situated at the Minbu Basins, Central Cenozoic Belt of Myanmar. The Tertiary rock sequences are well exposed in the area especially, Pegu Group (Oligocene-Miocene) and the Irrawaddy Formation (Miocene to Pleistocene). There are two parts of Pegu Group and of each part into three lithologic units of Formation rank was described by Aung Khin and Kyaw Win (1969). The stratigraphic classification used in the research area is that of MOGE, which is as displayed in table (1).

**Table 1: The general stratigraphic sequence of the Minbu Basin**

<b>Subdivision</b>		<b>Age</b>
Irrawaddy Fm		Upper Miocene- Pliocene
	Unconformity	
Obogon Fm		Middle Miocene
Kyaukkok Fm		Lower Miocene
Pyawbwe Fm		Lower Miocene
	Unconformity	
Okhmintaung Fm		Upper Oligocene
Padaung Fm		Lower Oligocene

## **Okhmintaung Formation**

### **General Description**

It was named as “Okhmintaung Sandstone” by Lepper (1933) from Okhmintaung ridge. It is later named as “Okhmintaung Formation” by Aung Khin and Kyaw Win (1969).

### **Lithology**

This formation has buff to yellowish brown in fresh colour, grayish brown in weather colour, thick bedded to massive, argillaceous and conglomeratic sandstone with sandy shales and locally bands of hard shelly limestone.

### **Outcrop description**

This formation is especially exposed eastern and western part of the Kyun Chaung Section. In the Ngaku Chaung section, this formation can be found eastern and western flank of the area. Normal fault structure can be found in this formation.

### **Stratigraphic Description**

Transitional boundary is occurred the lower part of the formation with Padaung Formation and unconformable contact at the upper part of the formation to Pyawbwe formation.

### **Sedimentary Structure**

In the massives and stone, the sedimentary structures of medium-scaled troughcross-beds and sigmoidal can be seen. Mud drapes are also present. Flaser bedding, lenticular bedded, sand-mud interlayers, ripple bedding and cross-stratification are found to be locally. Boiturbation also occur.

### **Fauna and Age**

Pelecypods, gastropods and foraminifera are occurred in this formation. Age of the Formation is Late Oligocene (Chattian). The total thickness of the Formation is about 2200ft.



**Figure 4:** Reddish brown color of Okhmintaung Sandstone with gypsum content & concretion at Kyun Chaung section, Kyun Chaung Village



**Figure 5:** Thin to medium bedded of buff color Okhmintaung Sandstone with shale interlayer that is faulted at Kyun Chaung section, Kyun Chaung Village



**Figure 6:** Buff colored Sandstone of Okhmintaung Formation with iron concretions at Kyun Chaung section, Kyun Chaung Village

## **Geological Structure**

### **General Statement**

In the research area, the most prominent features is fold which related to the regional structural framework. It occupies at the Minbu Basin, the Central Cenozoic Belt of Myanmar. Regionally, Tangyi Taung and its environs is essentially the southern part Yenangyat–Chauk anticline which is trending north – south and is elongated strongly asymmetric with a steeply dipping east limb and a gently dipping west limb. The eastern limb of this anticline is cut into many segments by a series of thrust faults and eastern flank of the anticline is affected by Yenangyat–Chauk Thrust, trending north-south.

### **Folds**

Asymmetrical anticline fold is present at the eastern part of the research area. At the eastern limb of the anticline, the general dip of the rocks inclines at a high angle (about 75°) while western limb have a moderate in



inclination (about 35°). The anticlinal axis is trending nearly north-south and plunging towards north. In the eastern part of the research area, Padaung formation is mainly exposed and it also occupies the crestal portion of the anticline and where mainly bluish grey colored shales are exposed. This formation is flanked by Okhmintaung Formation. The eastern limb of the anticline (in the eastern part of the research area) is deeply eroded by weathering and nearly vertical beds are exposed. The continuation of this anticlinal fold is also exposed at a stream-cut section in Kyun Chaung valley and also along the foot path. At the northern part, the anticlinal axis is cut by NE-SW trending strike-slip fault.

### **Faults**

There are two strike-slip faults in the present research area. These faults are recognized along the stream valleys such as Paungkatot Chaung in the western part and Kyun Chaung in the eastern part of the research area. These strike slip faults are trending NE-SW direction. They cut across the fold axis of N plunging anticline, which is mainly composed of Padaung Formation.

### **Thrust Fault**

This fault is also called Yenangyat–Chauk thrust (Khin, 1991), eastern part of the area. At this thrust exposed the rocks of Irrawaddy Formation dip randomly towards various directions with varying dip amounts?

### **Depositional Environment**

According to the lithofacies analysis, at least five different lithofacies can be recognized in Okhmintaung Formation:

1. Sand –Mud interlayer facies
2. Bluish Grey Shale Facies
3. Bioturbated Sandstone Facies
4. Fossiliferous Sandstone Facies
5. Ripple Sandstone Facies



**Figure 7:** Photograph showing the Sand-Mud interlayer Facies of Okhmintaung Formation



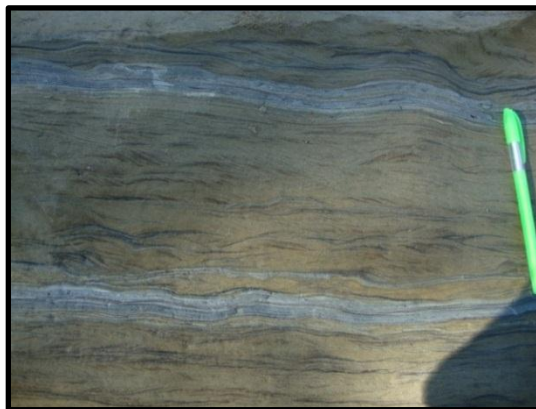
**Figure 8:** Photograph showing Bluish grey Shale Facies of Okhmintaung Formation



**Figure 9:** Photograph showing Bioturbation Sandstone Facies of Okhmintaung Formation



**Figure 10:** Photograph showing Fossiliferous Sandstone Facies of Okhmintaung Formation



**Figure 11:** Photograph showing Ripple Sandstone Facies of Okhmintaung Formation

The medium to coarsed grained sediments with high energy bed forms and internal structures characterized the lower shorefacies (or) subtidal area as depositional environment.

**Table 2: Lithofacies and depositional environment of Okhmintaung Formation in research area.**

Fm	No	Facies Name	Distincts Sedimentary attribute	Possible depositional environment
O K H M I N T A U N G  F O R M A T I O N	1	Sand –Mud interlayer facies	Yellowish brown color sand and dark grey color shale. Medium grain sand size can be found. Upper part of the sand is thicker than the lower part of this facies. Average thickness of this facies is 2m.	mixed intertidal flat
	2	Bluish Grey Shale Facies	Bluish grey color shale. Nodular bluish grey shale is friable with a small amount of sand. Average thickness of this facies is 2m.	prodelta offshore area
	3	Bioturbated Sandstone Facies	Yellow color sand and medium grain sandstone. The primary sedimentary structure can be occurred in this facies mainly that bioturbation. Mud drapes and iron-concretions are found in this facies. Average thickness of this facies is 3m.	shallow marine
	4	Fossiliferous Sandstone Facies	Light grey color & medium sand. Fossiliferous is found at the top of the bed and mud clasts are also found. The size of the mud clasts are 0.5cm to 1cm in diameter. Average thickness of this facies is 7m.	beach or shore area
	5	Small Scale Cross Bedded Sandstone Facies	Yellow color sand with many micro-cross bedding and medium grain sandstone. The primary sedimentary structure can be occurred in this facies mainly that trough type cross-bedding. The cross-bedded is distributed in this facies. The size of the cross-bedding is 1cm in length and it is shown bidirection. Average thickness of this faices is 3m.	Channel

### Summary and Conclusion

The research area is situated in the Pakkoku district, Magwe Region of Central Myanmar. It is composed of clastic molassic sedimentary rocks of Upper Pegu Group of Oligocene- Miocene age. The research area occupies the eastern parts of the Minbu Basin which is one of the Tertiary Basins in Central Cenozoic Belt. Besides, it is located in forearc basin. Stratigraphically, Oligocene of Padaung and Okhmintaung Formations (Rock units of Lower Pegu Group) unconformity overlain by Early Miocene Pyawbwe and Kyaukkok Formation (Rock Units of Upper Pegu Group) which in turn Mio-Pliocene Irrawaddy Formation unconformably overlain on the Pegu Group. By the petrographic analysis, the sandstones of the Okhmintaung Formations can be regarded as lithic arkose in composition. The Okhmintaung Formation yields Sand –Mud interlayer facies, Bluish Grey Shale Facies, Bioturbated Sandstone Facies, Fossiliferous Sandstone Facies, and Ripple Sandstone

Facies are deposited in intertidal and subtidal environments. The main economic interest of the Kyun Chaung area is petroleum extraction from sand reservoir.

### **Acknowledgement**

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