



Economic Potential and Coal Mining Hazards in the Lakhra Area, Sindh, Pakistan.

***Seema Naz Siddiqui**, Department of Geology, FUUAST, Karachi, Pakistan

Sohail Anjum, Department of Geology, FUUAST, Karachi, Pakistan

Viqar Husain, Department of Geology, University of Karachi, Pakistan



Contents

- ▶ Aims and objective
- ▶ Introduction
- ▶ Stratigraphy of the area
- ▶ Study area
- ▶ Bara Formation
- ▶ Tectonics and Structure
- ▶ Coal Geology
- ▶ Mining Hazard
- ▶ Economic Potential
- ▶ Thermal power generation
- ▶ Recommendation



Aims and Objective

- ▶ To discuss economic potential of Lakhra Coal Field
- ▶ Utilization of coal in Thermal power generation
- ▶ Indicate the mining hazards of the field
- ▶ How to improve the mining conditions
- ▶ How to get the attention for the investment of national and International firms



Introduction

- ▶ The Lakhra coal field lies 141km from Karachi in the North West direction, 35km north west of Hyderabad and 15km west from Jamshoro (in between latitudes $25^{\circ}30'$ and $25^{\circ}45'$ N and longitudes $68^{\circ}0'$ / $68^{\circ}15'$ E)
- ▶ Coal field spreads over 1309 sq.km on both sides of Jamshoro-Dadu metalled road
- ▶ Coal seams are at shallower depth (50 to 450 m) in the lower part of Ranikot group of Paleocene age
- ▶ Coal rank is Lignite A to Bituminous C
- ▶ Underground conventional mining technique is being used



Stratigraphy of the Area

Age	Group	Formartion Member	Thickness	Lithology	Lithological Description
Recent		Alluvium	Thin		Silt and sand
Pliocene		Manchar Fm.	18.28 m		Ferruginous pebble Conglomerate, And poorly sorted Sandstone clay,
Early Eocene		Laki Lst Member	20.7 m exposed in the area of 40C/2 330 feet thick resistant cliff In the Lakhra-Khanote Section		Limestone, cream Coloured, chalky, fossiliferous, hard resistant cliff
Early Eocene		Sonhari Member			Laterites
Late Paleocene	Ranikot Group	Lakhra Fm.	137.16 Min the Lakhra-Khanote Section but 243.8 M in Lakhra-Bholari Section		Fossiliferous, sandy limestone, sandstone, clay and shale.
Early Paleocene		Bara Fm.	20.7 M exposed		Sandstone, Shale claystone, coal seams.

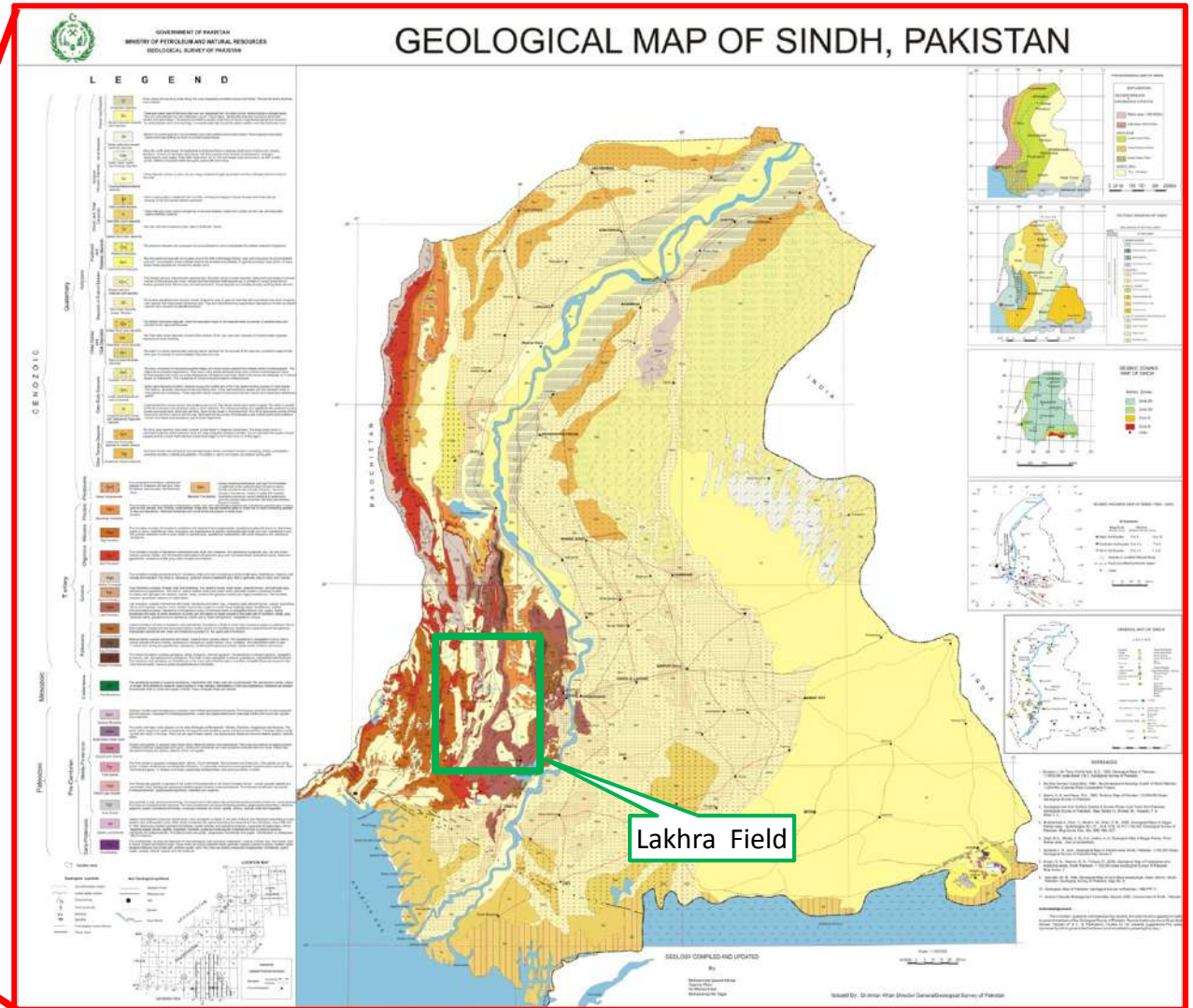
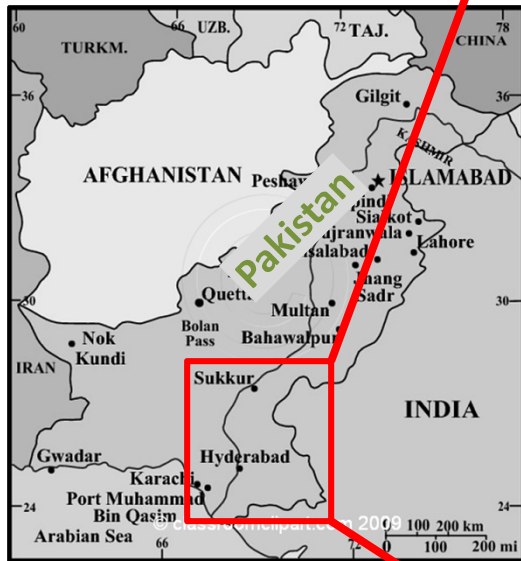


Coal seams

----- Unconformity



Study Area





Bara Formation

- ▶ Lower part of Ranikot group (Bara Formation) was deposited under fluvial conditions while the upper Ranikot (Lakhra Formation) is estuarine in origin
- ▶ Bara Formation is composed predominantly of sandstone with subordinate claystone, shale, siltstone and coal seams of variable thickness
- ▶ Claystone, shale and siltstone are light grey to grey, pyritic, coaly films irregularly distributed partly sandy
- ▶ Coal is black to brownish black resinous, pyritic and crumbles to small chips on exposure to air and sun for few days and very combustible
- ▶ Dhanwari, Lalian and Kath are the 3 main coal seams found along the crest of the anticline
- ▶ Lalian Coal seam is easily mineable, present at the depth of 26 to 122m below the surface, underlain and overlain by the clay stone



Tectonics & Structure

- ▶ The area contains a doubly plunging symmetrical anticline, known as the Lakhra anticline (Ghani et al, 1971)
- ▶ Dips of the beds are gentle and vary from 1° to 6° approximately on both the flanks of anticline
- ▶ Faults run nearly north to south at dips of 70° to 90° , towards east and west in the eastern and western flanks



Coal Geology

- ▶ Lithology of the formations indicate that they have been deposited under shallow water to swampy conditions
- ▶ Lower Ranikot Group (Bara Formation) was deposited under fluvial conditions while the upper Ranikot (Lakhra Formation) is estuarine in origin
- ▶ Coal is of brown lignite rank with low heating value and high moisture and sulphur content



Coal Grading of Lakhra Field

▶ Average content:

- ▶ Moisture = 28.9%
- ▶ Volatile matter = 28.0%
- ▶ Fixed Carbon = 25.2%
- ▶ Ash = 18%
- ▶ Sulphur = 4.7 to 7.0%
- ▶ Calorification Value = 466 to 7552 btu / lb
- ▶ Rank Lignite A to Bituminous C
- ▶ Depth = 50 to 450m



Mining Hazards (1/2)

- ▶ Coal Field is neglected by the concerned authorities
- ▶ 650sq. Km area is allocated for power generation rest of the area is under sindh Government to provide mining lease
- ▶ No proper rules and regulation are followed before and after providing the lease
- ▶ Primitive mining methods are a great hazard
- ▶ Lack of awareness of mechanized mining, skill labour and latest scientific knowledge are causing severe damage
- ▶ Without any proper rules and regulation mine owners treat their staff as slaves
- ▶ Basic infra structure for living is insufficient for miners



Mining Hazards (2/2)

- ▶ Environmental related awareness can not be seen in the area
- ▶ Medical facilities are only on papers
- ▶ Mine workers are constantly on life threat
- ▶ Roof of mines, shaft rope, gas explosion and coal dust explosion like accidents may occur any time
- ▶ Many workers are affected by respiratory and hearing loss problems
- ▶ After completion of mine no precautionary measures are taken for rehabilitation
- ▶ Huge amount of mine waste is thrown in the area
- ▶ Ground water may cause many types of hazards for the mine workers



Glimpses of the Field (1/2)



Glimpses of the Field (2/2)

Equipments laid Improperly on the ground



Mine Entrance



Unsafe Machinery





Economic Potential

- ▶ One of the largest and ignored fields of Asia with easy accessibility
- ▶ Reserves estimated near about 1328 million tonnes, only 244 million tonnes is measured and mined with the latest techniques
- ▶ 8000 tonnes of coal, per day, is mined from the field while annual coal extraction is about 3 million tonnes whereas the requirement of the country is 9 million tonnes
- ▶ 50 mining companies are engaged in the extraction of coal from the field
- ▶ Some local brick kilns and some cement factories are purchasing the coal at Rs 4000-5000 per tonne



Thermal Power Generation

- ▶ Lignitic coal of the field is most appropriate for thermal power generation commercially
- ▶ One power generation plant producing 150MW was installed near the field in the 60's
- ▶ Plant currently operates to produce only 20MW due to lack of interest from the authorities as the plant tops the list for privatization
- ▶ Many plans were not executed from 1990 to 2017 that were once under consideration for power generation from public and private sectors
- ▶ Use of Lakhra coal for thermal power generation will be more value added and profit oriented for the mine owners and it will also save the huge transportation cost by trucks to different parts of the country



Recommendation

- ▶ Government must take immediate action regarding exploitation of Lakhra coal reserves and computerize all the related data
- ▶ Long terms policies and plans for the field should be executed by the governing authorities and experts
- ▶ Implementation of Labour laws should be made mandatory
- ▶ Attractions and relaxations will encourage the investors to install small power generation plants near the field that may help to overcome energy crisis in a limited manner
- ▶ Mining related education should be made compulsory for the miners