

Hard rock in bangladesh



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Hardrock a term used loosely for igneous and metamorphic rock, as distinguished from sedimentary rock. The hardrocks of Bangladesh are of four types: (i) Maddhyapara subsurface hardrock, (ii) Bholaganj-Jaflong hardrock concretions, (iii) Tetulia-Patgram-Panchagarh hardrock concretions, and (iv) Chittagong-Chittagong Hill Tracts sedimentary concretions. The items ii, iii and iv are usually considered as gravel deposits. Maddhyapara subsurface hardrock In 1974-75 the geological survey of bangladesh (GSB) drilled six wells in and around Maddhyapara and confirmed the existence of Precambrian hardrock at very shallow depths.

In these wells the Precambrian hardrock was encountered between depths of 128m and 154m. The depth of 128m was reported from well GHD-24.

Techno-economic feasibility study of the Maddhyapara hardrock project was carried out by SNC (Surveyor Nenniger and Chenvert), a Canadian consultancy firm. In 1977, SNC opined that the project would be economically and technically sound and profitable. Finally, the Government of Bangladesh approved the project in 1978.

However, the project started working formally from early 1994, following the signing of two international contracts for the Barapukuria Coal Mine Development Project and for the Maddhyapara Hardrock Mining Project between CMC of China and petrobangla, and NAMNAM of the Democratic Republic of Korea and Petrobangla respectively. The Maddhyapara underground project is approximately 1.44 sq km. The hardrock are mined following the methodologies of room and pillar and sub-level stopping. In order to build up the mine, two shafts with a diameter of 5m each and set 240m apart will be installed.

One of these (cage shafts), designed to reach a depth of 243m, will be used for carrying machinery and mine workers. The other one (skip shaft) with a projected depth of 287m will be used for transporting hardrocks. Insofar as the Dupi Tila Formation, which immediately overlies the hardrocks in this region, is soft, an expensive freezing technique must be adapted in order to place the cage and skip shafts through this sedimentary formation. The Hardrocks are to be extracted from a depth of 170m to 230m below the surface.

The total reserves are estimated at 172 million tons and the mineable reserves are 72 million tons. At Maddhyapara these rocks consist commonly of gneiss and schists together with granite/granodiorite and quartz/diorite. Gravel deposits Wide areas of northern and northeastern parts of Bangladesh are covered with gravel beds. In the north, the gravels are well exposed at Dahagram-Angorpota, Patgram, Dalia, Chapani, Kaliganj in greater Rangpur and Tetulia, Vazanpur, Boalmari, etc in greater Dinajpur. These gravels are quite large (maximum recorded elongation is 30 cm) and are alternated with very coarse to medium sand.

They are quite fresh and well rounded, with a smooth surface. The sphericity and roundness of these gravels are high and they have quartz, quartzite, granite, gneiss and schist as their dominant lithologies. Composition of these gravels is identical with that of the Daling series of the himalayas. These gravel beds are grouped together as the Panchagarh sandy-gravel beds belonging to the Upper Pleistocene series. They are overlain by the Holocene series represented by alluvium and sometimes-fine sand, silt and clay.

The geological history and the environment of deposition of the Panchagarh sandy-gravel beds are quite interesting. During the last glacial maximum (ie 18, 000 years BP) the Himalayas were quite high and were glaciated. The glaciers extended up to the foothills. Dry climatic conditions prevailed during that time and the melt water was flowing over the Bengal plain through some narrow and deeply incised river systems. At the end of the last glaciation (upper part of Upper Pleistocene) monsoon rainfall was quite prominent and the glacier also started melting.

The melt water plus the amplified monsoon water flowed over the Bengal plain. The narrow river systems were over-loaded and surplus water flowed over the barind tract. During that time, Barind initial surfaces were dissected leaving some north-south elongated red bed islands as exhibited by the present morphology of the Barind Tract. These enormous water flows carried the gravels up to the Panchagarh-Dahagram-Dalia area and were deposited as some piedmont deposits.

On the other hand, the gravels of the northeastern part of Bangladesh are all exposed in the Jaintiapur-Bholaganj area in greater Sylhet district. Here the gravel beds are divided into two lithostratigraphic sub-units: older sub-unit (high terrace) and younger sub-unit (low terrace). The older sub-unit in the Jaintiapur area and Binda Tila that caps the hill tops have been named the ‘ Sona Tila Gravel Bed’. Similarly, the younger sub-unit of the Bholaganj area and the river bed deposits of the present river system have been named the ‘ Bholaganj Gravel Bed’. Both the sub-units belong to the Dihing Formation.

The Sona Tila Gravel Bed is equivalent to the Lower Pleistocene series and belongs to the Madhupur Clay formation while the Bholaganj Gravel Bed is equivalent to the Upper Pleistocene to Holocene series. Similarly, the former is weathered and the latter is fresh, hard and high quality derived from the Khasi-Jaintia Hill Ranges. The gravels of both the beds are of igneous and metamorphic origin. They have high sphericity and roundness values and as such suggest long transportation and longtime abrasion of the gravel sediments. They are made up of river borne deposits.

Apart from these, numerous hill streams also deposit gravels on the streambeds of the hill ranges and in the plains close to these ranges. These hill ranges are mostly located in the Sylhet, Chittagong and Chittagong Hill Tracts region. Also in the Teknaf-Cox's Bazar sea beach seven separate occurrences of gravels are present between Moderbunia chhara and Rajar chhara. These gravels are of sedimentary origin and mostly belong to the Surma and Tipam Group of sediments. Proper excavation of hardrock may partially fulfil the country's demand for constructing roads, bridges, dams and embankments.