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TEXTURAL, MINERALOGICAL AND GEOCHEMICAL PROPERTIES OF MARINE SAND RESOURCES OFF THE WEST COAST OF INDIA.

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Offshore sand is being mined in countries like France, Belgium, New Zealand, U.K, Japan and Australia. In Belgium, marine sand has been used for construction purposes over the last 30 years. European countries depend on marine sand for protecting coastlines against sea level rise due to global warming. Good quality sand should be free from any organic materials, chemically inert with low amounts of carbonate materials, and should consist of sharp angular durable grains free from coating of clay & silt. Marine sand is a mixture of materials of different grain size and can be used for construction works provided the salt content is removed. Coarse size fractions can be used for concrete works, and the fine & medium fractions can be used for plastering and brick works.

Preliminary investigations carried out off the West Coast of India, by the Marine and coastal survey division of the Geological Survey of India, have indicated that marine sand occurs up to 100 m water depth in the Arabian sea off Kerala and Karnataka between Quilon in the south to Udupi in the north. The thickness of the sand bodies varies from 0.25 cm to 3.2 m. The sand is intermixed with hard compact clay, carbonaceous silty-clay, shell fragments, wood pieces, laterite pieces, etc., indicating a mixed type of environment of deposition, i.e. palaeo-channel/palaeo-strandline or lacustrine. The majority of sands are poorly sorted to very poorly sorted, fine-skewed to very fine-skewed, and leptokurtic in nature indicating a high energy condition in the depositional environment.

The sand grains consists mainly of silica (SiO₂), and are angular to sub-rounded in shape. Quartz constitutes the major part (80-90%) of sand and the grains are transparent to opaque. The heavy minerals associated with sand are ilmenite, magnetite, monazite, zircon, rutile, garnet, kyanite, tourmaline, and pyriboles. Fine to medium sands dominate over coarse sands in the study area, and the average sand content is 80% and carbonates 6% , mud 10%, and granule 1%. The average percentages of

different types of sand are: very coarse sand, 10%; coarse sand, 20%; medium sand, 30%; fine sand, 30%; and very fine sand, 10%.

The source of all these types of sand can be traced to acid igneous and metamorphic rocks like charnockites, granites, khondalites, and gneisses of the Western Ghats hinterland. The absence of offshore silica sand deposits off Maharashtra could be explained by a hinterland of basic igneous rocks (Deccan basalt) that lack quartz. In Gujarat, the upland rocks are limestones and calcareous sandstones, which extend well into the seabed in territorial waters. Calcareous sands are invariably present in the EEZ of Gujarat in the continental margins between water depths of 100m and 450m, and were also found in a few core samples from abyssal plains at water depths around 2000m. They are purely of biogenic origin and are intermixed with silty clay and lime mud. Calcareous sands are also reported from Angria bank off Ratnagiri, Maharashtra in the EEZ, and are formed by comminution of coral fragments.

Key words: Sand, heavy minerals, carbonates, clay, quartz.

