AGGREGATE PROSPECTS OF LOCKHART LIMESTONE OF WATLI AND SIRALI AREAS, EASTERN SALT RANGE, PAKISTAN

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Abstract

In the eastern Salt Range the Paleocene strata is represented by Patala Formation (shale and sandstone with coal; lateral variation of Hangu Formation) and Lockhart Limestone followed by Eocene Nammal (shale, marl and limestone) and Sakessar (mainly limestone, lateral variation of Margala Hill limestone) formations. The Sakessar limestone (dipping toward north; famous for aggregate and cement raw materials) is peak forming located on the Salt Range thrust. The Lockhart Limestone is second resistant formation just below the first resistant Sakessar limestone, both are sandwiched by the Nammal shale, marl and limestone of low resistant and more erosionable due to its dominant shale lithology. The present study focuses on the Paleocene Lockhart limestone for aggregate resources and construction materials. Physical characterization of aggregate is the leading stage to boost construction industry and emphasis on the quality as well as implementation complications recognized with their use in construction material. Current study deals with petrographic, physical and mechanical characterization accompanied by assessment of Alkali Silica Reactivity potential for Lockhart limestone aggregate exposed in Watli and Sirali area of eastern Salt Range to explore its potential for utilization as a construction material in the engineering projects. Various tests such as gradation, optimum moisture content, soundness test, aggregate impact value, flakiness index and elongation index, Los Angeles abrasion value, specific gravity and water absorption were performed in accordance with AASHTO, BS and ASTM standards. Results of these experiments for twelve bulk specimens reveal mean aggregate impact value (13.71%-15.40%), optimum moisture content (4.3%-5.4%), soundness test (2.85%-2.93%), flakiness index (16.11%-19.09%), elongation index (11.12%-12.23%), los angeles abrasion value (23.93%-26.22%%), specific gravity (2.63-2.72) and water absorption (0.62%-1.34%), which suggest that the values of the limestone aggregate are within specified limits of their respective standards. An inclusive petrographic observation of 35 samples has been carried out to identify specifically the presence of deleterious minerals. Petrographic investigation indicates the presence of 1% strained quartz in limestone that suggests the aggregate is not prone to ASR. The research depicts that the Lockhart limestone engineering properties fall within the specified limits and mineralogically does not comprise higher concentration of deleterious minerals, hence, can be used as aggregate source for construction purpose.