

EFFECTS OF MINERALOGY AND SEDIMENTARY FACIES ON THE GAMMA RAY SIGNATURE IN BARALABA CM FORMATIONS, BOWEN BASIN, AUSTRALIA.

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ABSTRACT: The sedimentary fill in the foreland basin is mainly controlled by tectonic factors that govern sediment supply and accommodation space. The Bowen Basin (Australia) is a foreland basin and its sedimentary fill is characterized by continental fluvial systems deposits occurred during the Late Permian. The sedimentary environments and mineralogical composition of the Baralaba Coal Measures Formation from the borehole Baralaba 5C, southern Bowen Basin, consists of a continental fluvial system developing on the foredeep zone. The Baralaba 5C was individualized in nine depositional environments, characterized by fining upwards parasequences. They are mostly represented by medium- to coarse-grained sandstones (facies St) at the bottom, with basal abrupt contact, with fining upwards sequence and coal deposit in the end of each cycle. Using facies association and architecture elements to determine the depositional fluvial systems: Braided, anastomosing and meandering style. This variation of the systems occurs along the core, from the lower part (braided) to the upper part (anastomosing and meandering). The main packages of sandstones (facies St) are classified as litharenites, composed mainly by volcanic lithic fragments and are also texturally immature. The small mineralogical variation in the sandstone framework along the Baralaba 5C core indicates limited changes in the source-rock. Authigenic minerals indicate eodiagenetic, mesodiagenetic and telodiagenetic processes, including illitization of smectite, replacement of grains by carbonate cement, silica and iron oxide cements. The upwards increase in smectite and illite can be directly related to mudstone packages; as well as upwards decrease in plagioclase and volcanic fragments are evidenced in sandstones (facies St) packages. The gamma ray pattern exhibits funnel, bell, irregular and cylinder shapes along the borehole. It was reported that the gamma ray signature, in most of the time, is not well correspondent to the lithology, such as coarse sandstone has similar values to mudstones. The ratio from sandstones/mudstones shifts from 2:1 in the lower part of the core to 1:2 in the upper part of the core, as the environment is shifting from high energy system (braided) that has cylindrical gamma ray signature to lower energy system (anastomosed and meandering) that is predominant irregular gamma ray signature, due to tectonism and climate change. Anomalous values of gamma ray for sandstone packages are caused by high amount of volcanic lithic fragments and heavy minerals.

Keywords: GAMMA RAY; BARALABA CM FORMATION; BOWEN BASIN (AU)