SHALE GAS IN THE AMAZON BASIN

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RESUMO: In addition to the potential mineral exploration, the Amazon sedimentary basin can be prospective for shale gas retained in unconventional natural-gas reservoirs. Unlike conventional gas reservoirs, there is no apparent process of gas accumulation or secondary migration from outside sources for shale gas. The newly born hydrocarbons are molecules of small size, but they take more room in the source rock than the original kerogen because they change from solid matter to liquid and gas products. They are going to be permanently expelled into the rocks that surround the source rock. Shale gas is found in organic shales because these rocks ordinarily have insufficient permeability to allow all gas generated to escape. When the gas is naturally expelled from the shale during the migration process, part of the gas is held in the overmature shale because it has a porosity of about 6%. The gas is held in natural fractures, some in pore spaces, and some is adsorbed on organic material. Shales have low matrix permeability, so shale gas production in commercial quantities requires manmade fractures to enhance permeability. These rocks are sufficiently brittle and rigid to maintain fractures open. The challenge is to release it from a rock as impermeable as concrete. The two main technological advances in shale gas exploration are water-fracs and horizontal drilling. Although these technologies are not new, their application to Texas field plays resulted in significantly improved economics and opened up new areas previously thought to be uneconomic. The stratigraphic record of the Amazon Basin starts in the Ordovician and ends in the Pleistocene, but is punctuated by many sedimentary breaks. The interest section, i.e., the organic black shale of the lower Barreirinha Formation (Curuá Group), of Late Devonian (early Frasnian - middle Famennian) age, shares many features in common with the Chattanooga organic shale of the interior basins of the United States. The heat effect of numerous diabase intrusions played an important role in shallow areas of the central-eastern part of the Amazon Basin, where dykes and sills intruded into the Devonian sequence. A higher degree of organic maturation (Vitrinite Reflectance > 1.35 %) was reached only because of the heating effect of the diabase dykes and sills in the eastern part of the Amazon Basin. Preliminary volumetric calculations indicate that up to 1 trillion bbl of oil equivalent were expelled from the source rocks, but enough commercial gas remains trapped within the shale beds. Wells in Newark East Field (Texas-USA) typically produce from depths of up to 2285 m at rates ranging from 0.5 to above 4 mmcf/day. Shales at similar depths occur in both flanks of the eastern Amazon Basin.

PALAVRAS-CHAVE: SHALE GAS; AMAZON BASIN; EXPLORATION TARGETS.