PICARD, M. DANE, Univ. of Utah, Salt Lake City, Utah

Sandstone and Oosparite in Arapien Shale (Jurassic), Central Utah: Subsurface and Surface Studies

Mixed terrigenous and carbonate rocks are difficult to study. Such rocks in the Arapien Shale are misidentified in the field and in the subsurface. Examination only with hand lens and binocular microscope is insufficient for outcrops, cores and well cuttings. Mechanical logs are less useful than is the binocular microscope. Thin sections are thus necessary for thorough study.

Sandstone and oosparite in the Arapien Shale are intimately associated in the same beds. Grains are prominent (45-80% of total rock volume). Based on numbers of contacts per grain, they are classified as floating. Some show one to three contacts per grain of the tangential type. Grains range from 2ϕ to 4ϕ and are dominantly subangular. Sorting is moderate (0.50-1.00ϕ). Sandstone beds contain up to 15% oolite; limestone beds contain 15-65% oolite.

The sandstone (rocks with $>$ 50% terrigenous grains of sand size) is subarkose, similar in composition to sandstone in the underlying Jurassic Navajo Sandstone. All the carbonate rocks (rocks with $>$ 50% allochemical and orthochemical constituents) contain appreciable amounts of oolite. There is no natural break between calcareous, oolitic subarkose and sandy oosparite.

The oolitic subarkose and sandy oosparite have had similar diagenetic history. The general sequence, from oldest to youngest event, is: (1) thin clay rinds and hematite staining, (2) quartz and feldspar overgrowths, (3) rare pressure solutions, (4) recrystallization of micrite to sparry carbonate, (5) pore filling by sparry calcite, (6) clay minerals from alteration of feldspars and rock fragments entering pore space (not evident in carbonate rocks), and (7) hematite as both a stain and pore filler.

In order of decreasing utility for understanding these mixed terrigenous-carbonate rocks, the ranking is: petrographic microscope, binocular microscope, hand lens, and mechanical logs. Although this is evident to sedimentary petrographers, there has been little thin-section study of the Arapien Shale, a significant rock unit in the Utah part of the Overthrust Belt.

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