

INTRODUCTION

The data below are the results of petrographic analyses on 35 sandstone samples (23 sidewall cores, 12 core chips) from the Pelican-5 well.

SUMMARY

Petrography and SEM

The rocks are generally litharenites which contain fairly well sorted sand-grade grains of quartz and lithic fragments. Feldspar, mica and heavy minerals are rare or absent. Sedimentary (shales, mudstones, chert) and metasedimentary (phyllites, schists) lithologies are by far the most abundant kinds of lithic clasts. Apart from chert (and possible rare limestones) they are deformable, soft fragments with fine-grained textures and abundant phyllosilicate minerals. Some retain vestiges of original outlines, others can be seen to have been squashed between adjacent quartz grains.

Long, curved and sutured grain boundaries are present in most samples.

Authigenesis is shown by quartz (epitaxial overgrowths), kaolinite (void filling aggregates) and carbonate (mostly partially replacing lithics).

There is no evidence of genuine, muddy matrix and the rocks therefore appear to be sedimentologically mature, although derived from a not-too-distant provenance of sedimentary terrain.

1. Porosity

In the Pelican-5 samples there has been precipitation of quartz, carbonate, kaolinite and smectite. Quartz, and possibly carbonate, crystals have grown on a template provided by pre-existing crystals whereas kaolinite and smectite have grown by direct precipitation from pore waters. Feldspars in these rocks appear to be fresh and not spatially associated with the kaolinite; it is therefore unlikely that kaolinite development is associated with alteration of detrital feldspar.

Primary porosity in these Pelican-5 sandstones was reduced initially by the deformation of soft lithic fragments between the more rigid quartz grains. The extent to which this primary porosity has been occluded by this process is proportional to the volume of lithic fragments in the sandstones. These volumes range from approximately 5-50% in the samples examined. Some microporosity remains in these lithic fragments although it is unlikely that much of this porosity is interconnected.

The small volumes of primary interconnected pore spaces remaining were then filled with authigenic quartz (mainly from quartz chlorite) and finally carbonate (mainly dolomite). Some microporosity remains between these authigenic clays and much of this is likely to be interconnected.