

APPENDIX B

EXOIL NO LIABILITY

SUMMARY PETROLOGICAL REPORT

ON SAMPLES

from

EAST MERREENIE no 4 at 4600 feet,
4630 feet, 4640 feet, 4730 feet,
8578 feet.

by

Cundill, Meyers & Associates Pty Ltd.



M0970070

C O N T E N T S

	<u>Page</u>
I. GENERAL SUMMARY	1
II. BRIEF PETROLOGIC DESCRIPTIONS ON:	
1. Specimen CMA 67-0-203 East Mereenie No 4 at 4600 feet	2
2. Specimen CMA 67-0-204 East Mereenie No 4 at 4630 feet	4
3. Specimen CMA 67-0-205 East Mereenie No 4 at 4640 feet	5
4. Specimen CMA 67-0-206 East Mereenie No 4 at 4730 feet	6
5. Specimen CMA 67-0-207 East Mereenie No 4 at 8578 feet	8



M0970071

I. GENERAL SUMMARY

Generally, the reservoir potential of the samples is low due to the effectiveness of orthochemical bonding (which forms a tight sediment).

The rocks represented come from the middle and lower Pacoota Sands, and the last specimen (client's number 5) possibly from the Hay Creek Limestone Member.

These rocks are generally tightly bonded although sediments from the Upper Pacoota Sands have a porosity in excess of 10% and permeabilities in the order of 50 millidarcies.

The rocks were deposited in a marine environment and appear, from mineralogical evidence, to have a mixed provenance which appears to be dominantly igneous in origin.

Diagenetic changes include deposition of orthochemical cements and replacement of one cement by another. The development of authigenic mica/chlorite is noticed in some rocks.


M0970072

II. BRIEF PETROLOGIC DESCRIPTIONS ON:1. (i) REFERENCE

Specimen No CMA 67-0-203.

East Mereenie No 4 at 4600 feet. Slides 1A & 1B.

(ii) MEGASCOPIC DESCRIPTION

The hand specimens are dark grey: 1A contains a rounded red pebble where-as 1B is slightly foliated. Both specimens are fine grained and tight.

(iii) SUMMARY MICROSCOPIC DESCRIPTION

The main rock in 1A is a micaceous siltstone. It consists of angular to sub rounded quartz grains of siltsize (40%) with accessory microcline, oligoclase, biotite, muscovite, chlorite and hornblende (total accessories = 15%). The matrix is quite abundant (45%) and consists mainly of kaolinite, fine mica and quartz. A little authigenic pyrite is present throughout the rock. This is associated with calcite or matrix material. The rock is well sorted, with a large percent of matrix, some of which may be altered from detrital material. The pebble is also a well sorted siltstone. It consists of quartz 50% with accessory feldspar, zircon, apatite and hornblende (5%). The matrix is dominantly carbonate, with minor limonite giving the red colour to the pebble.

The supposed "intrusive rock" 1B is also a calcareous cemented siltstone. It is probably also a pebble as it is very similar to the pebble in 1A. Angular quartz is common, but these grains often show well rounded cores with angular overgrowths. Thus an original quartz cement may have been replaced by carbonate. Accessory microcline, tourmaline, zircon, muscovite and hornblende indicate an acid igneous origin for this rock.

Specimen No CMA 67-0-203 continued



M0970073

The main rock 1A, is a tight, well cemented rock with poor reservoir characteristics. The accessory minerals indicate an acid igneous or metamorphic provenance, although the pebbles favour a reworked sediment. The provenance is thus obscure.

(iv) CLASSIFICATION

Subgreywacke (Pettijohn 1957).



M0970074

2. (i) REFERENCE

Specimen CMA 67-0-204

East Mereenie No 4 Well at a depth of 4630'. Slide No 2.

(ii) MEGASCOPIIC DESCRIPTION

The hand specimen is fine white sandstone, with rare sedimentary pebbles and red brown limonite rich spots. it has a tight granular texture.

(iii) SUMMARY MICROSCOPIC DESCRIPTION

The rock is a fine sandstone consisting of sub angular to angular quartz (90%) with accessory acid plagioclase, hornblende and rounded shaley rock fragments (5%). Some of the quartz grains show secondary overgrowths, with relic well rounded cores. A small pebble of fine foliated quartzite is also present, with its foliation defined by dimensional orientation of strained quartz grains and muscovite flakes.

Orthochemical material is represented by a small amount of iron stained carbonate and grains of anhydrite (5%). The porosity of the rock is about 5 - 10%.

The detrital quartz is of two types - (1) strained metamorphic quartz similar to that in the pebble, (2) unstrained quartz with trains of inclusions which appear to be igneous. The provenance is thus probably twofold - regional metamorphic and acid igneous rocks.

(iv) CLASSIFICATION

Orthoquartzite (Pettijohn 1957).



M0970075

3. (i) REFERENCE

Specimen CMA 67-0-205

East Mereenie No 4 at 4640 feet. Slide No 3.

(ii) MEGASCOPIC DESCRIPTION

The hand specimen is a fine white sandstone. It has a mottled appearance with pink spots occasionally scattered through it. These spots, with a diameter of approximately 1 mm are probably clots of iron stained carbonate.

(iii) SUMMARY MICROSCOPIC DESCRIPTION

The specimen is a fine sandstone consisting mainly of a welded mosaic of quartz grains (85%) with minor feldspar and rock fragments. The quartz grains are sub angular in shape and up to 0.5 mm in diameter. Secondary overgrowths are common and most quartz grains show sutured boundaries with adjacent grains. Many of the quartz grains carry rutile needles and bubble trains indicating probable igneous origin. Feldspar (5%) consists of both acid plagioclase and microcline occurring in well rounded grains. Rock fragments consist of rounded pieces of siliceous shale. Sorting is good and the texture is mature. Accessories include anhedral zircon, rutile, hornblende and euhedral tourmaline.

Orthochemical cement appears absent. Allochemical cement consisting of patches of carbonate and grains of anhydrite is scattered through the rock. This cement locally embays and replaces quartz grains. The mineralogy strongly suggests an acid igneous provenance with some reworked sedimentary detritus. Visible porosity is very small, due to the introduction of allochemical cement and the overgrowths on quartz grains.

(iv) CLASSIFICATION

Orthoquartzite (Pettijohn 1957).



M0970076

4. (i) REFERENCE

Specimen CMA 67-0-206

East Mereenie No 4 at 4730'. Slide No 4.

(ii) MEGASCOPIC DESCRIPTION

The hand specimen is grey blue in colour and is characterised by a fine lamination (0.5 mm thick) in the rock. The rock is fine grained and soft. It appears stained with limonitic material.

(iii) SUMMARY MICROSCOPIC DESCRIPTION

The specimen is characterised under the microscope by the strong preferred orientation of fine redded muscovite and chlorite plates. This orientation often defines a strong bedding fissility, that is the orientation of chlorite/mica is parallel to bedding which is defined by a lamination (on the microscopic scale).

The rock is seen to be composed of fine (0.01 mm) distinctly angular grains of quartz which have undulose extinction. Fine redded muscovite (up to 0.05 mm) and strongly pleochroic chlorite of similar size also constitute an essential part of the detritus.

The material of matrix size makes up 70 - 80% of the rock. The texture is immature. The principal accessory minerals are fine euhedral granular magnetite (0.04 mm in size) and some small rounded grains of zircon.

A portion of the rock is heavily stained with limonite and this has apparently replaced some of the detritus.

The source rocks were possibly acid igneous rocks with the weathered kaolinite being deposited in amongst detrital quartz grains.



M0970077

Much of the clay material under the influence of burial gave rise to the development of mica/chlorite aggregates with a strong preferred orientation parallel to bedding.

Visible porosity is decreased by the presence of a fine grained matrix.

(iv) CLASSIFICATION

Shale (Pettijohn 1957)



M0970078

5. (i) REFERENCE

Specimen CMA 67-0-207

East Mereenie No 4 Well. Core No 7 at 8578'.

(ii) MEGASCOPIC DESCRIPTION

White and grey rock, fine grained, moderately hard and with low porosity.

(iii) SUMMARY MICROSCOPIC DESCRIPTION

The specimen is composed mainly of a mosaic of fine to very fine prismatic to interlocking grains of a carbonate mineral. This mineral is very clear under the microscope, suggesting dolomite. it makes up 95% of the rock.

Other minerals are secondary, and include anhydrite, quartz and limonite. These minerals are found surrounding the grains of carbonate. Bedding is apparent in the slide and is characterised by finer and coarser grains. The rock seems to have formed in evaporite conditions, due to the presence of carbonate and anhydrite. The carbonate has possibly recrystallised, as euhedral grains are common - these are not likely to be primary detrital grains.

Porosities are effectively blocked by the fine grained nature of the rock, and the occurrence of secondary minerals in interstices.

(iv) CLASSIFICATION

Fine grained dolomite.



M0970079