DEPARTMENT OF MINES AND ENERGY
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THE PETROLOGICAL AFFINITY BETWEEN SPECIMEN 5538 RS 101 AND THE MURNAROO SANDSTONE IN OTHER DRILL HOLES

GEOLOGICAL SURVEY

by

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ABSTRACT

Petrographic comparison between specimen 5538 RS 101 and sandstone specimens from Murnaroo 1, 5001 and 5002 indicates that a Murnaroo Sandstone affinity for RS 101 is unlikely but cannot be entirely ruled out.

INTRODUCTION

Drill core from a diamond drill hole in the Officer Basin has been recovered after being abandoned for several years in the bush. A specimen of sandstone from the core was received from Colin Gatehouse for petrographic comparison with sandstones assigned to the Murnaroo Sandstone in DDH Murnaroo 1, 5001 and 5002.

PETROGRAPHY

Specimen 5538 RS 101, TS C45688

Rock name. Highly porous quartz sandstone.

Hand specimen.

The specimen is a light brown, medium grained, well sorted, highly porous quartz sandstone. The porosity includes cavities of greater diameter than the framework clasts and is probably secondary. No matrix is visible in hand specimen.

Thin section

Quartz is clearly the most abundant constituent but is less abundant than appeared in hand specimen. Much of the granular material consists of lithic fragments of siliceous rock rather

than of monocrystalline quartz. Some of the lithic fragments are of earlier quartzites, generally of fine grain size, but many are of sandstones containing sericitic mica and clay. A few clasts are of quartz which is fine enough in grain size and imprecise enough in outline to be of colloidal origin. Other examples of very fine grained quartz are the products of stress granulation of coarse grained quartzite.

The grains are generally angular and moderately well sorted.

Considering only the monocrystalline quartz grains, the proportion of strained to unstrained quartz is in the order of 60-40. With quartzite lithic fragments included as strained quartz the percentage becomes about 75%.

Other framework grains include scattered flakes of muscovite and very rare, angular tourmaline.

The porosity of the rock is very high and consists of a connected system of cavities which are considerably larger than individual grains. A brown, amorphous material is present in some smaller cavities and along some grain boundaries: this may be kerogen. There is no direct evidence of mobilised bitumens but the impregnating resin is stained brown in places, possibly by dissolved organic matter.

The remaining framework is largely clast-supported but patches of clay are present between many quartz grains. Some of the clay is probably a remnant of an original matrix but where clay patches are of a size comparable to that of the clasts, they may be alteration products of former feldspars. In places the clay minerals are relatively coarse grained and a few clasts of mica are altering in place to clay of the same grain size as the mica flakes.

Comment

Comparisons between specimen 5538 RS 101 and sandstones identified as members of the Murnaroo Sandstone sequence are influenced by the absence of recognisable feldspar in RS 101. Most sandstones identified as Murnaroo are feldspathic. However, the presence of clay in patches comparable in size to the clasts of RS 101 is possibly an indication of original feldspar in that rock. The high porosity indicates the activity of aqueous

solutions which penetrated the rock and may correlate with the absence of feldspar.

Even with this proviso there are very few similarities between RS 101 and any of the sectioned samples from Murnaroo 1. Apart from the dominance of quartz in the sandstones the rocks differ in the following categories:

5538 RS 101	Sandstones in Murnaroo 1
Good sorting	Generally poor sorting
Angular grains dominant	Generally good rounding
Angular tourmaline	Rounded tourmaline
No opaque oxides	Opaque oxides widespread
Clay as clasts and interstitially	Little or no clay
Mica as clasts	Thin mica partings
Open framework	Very close packed grains
No feldspar	Feldspar almost ubiquitous

Resemblance between the specimens from drill holes 5001 and 5002 and specimen RS 101 varies between moderate and very doubtful. The sampled intervals in 5002 bear very little similarity to specimen RS 101, because of a relatively close resemblance to the specimens from Murnaroo 1 and to substantial interstitial dolomite. Most of the specimens from 5001 are also unlike RS 101 but a few specimens are similar in some respects, though never in all respects. The similarities are occasional in specimens from between 570.5 m and 601.5 m and include: the absence of feldspar, the presence of clay and organic matter, angularity of the grains including some tourmaline, porosity and a similar mixture of quartz and siliceous lithic fragments. In general, however, the sediments are closely packed with moderate sorting at best, frequent mica partings, substantial feldspar and opaque minerals and rounded grains of tourmaline and zircon.

CONCLUSION

As far as may be determined from the specimens examined, RS 101 is not similar enough in fundamental petrographic characteristics to be correlated with the average Murnaroo Sandstone in drill holes Murnaroo 1, 5001 and 5002. However, there is evidence in some specimens near the bottom of the

sandstone intersected and sampled in 5001, that a variation from the average sandstone lithology might resemble RS 101 closely enough to suggest a correlation. The possibility that clay in RS 101 may be derived in part from feldspar introduces significant uncertainty into correlation based on petrographic features.

In summary, it appears unlikely that RS 101 is Murnaroo Sandstone but the evidence is insufficient to rule out completely such a relationship.

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