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SADME OFFICER BASIN STUDY GROUP :

STRATIGRAPHIC DRILLING PROJECT PETROGRAPHIC SAMPLING AND ANALYSES

PROGRESS REPORT NO. 2 RE. MURNAROO 1 DRILLHOLE

Submitted by
Amdel Ltd
1979

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Government of South Australia
Primary Industries and Resources SA

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CONTENTS ENVELOPE 3430 DME 547/78

TENEMENT: NOT RELATED

TENEMENT HOLDER: THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

REPORTS:

STEVESON, B. 1978
Stratigraphic Drilling MUrnaroo No. 1
Petrography. (pgs. 1-6)
(No Plans)

DM 547/78
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The Australian Mineral Development Laboratories
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Your ref: 11.06.~~368~~ 324. STRAT. DRILLING.

In reply quote: GS 1/1/231

29 November 1978

Director-General,
Department of Mines & Energy,
Post Office Box 151,
EASTWOOD, 5063.

~~SOURCE-ROCK STUDIES - SEDIMENTARY BASINS~~ STRATIGRAPHIC DRILLING.

~~PROGRESS REPORT NO. 2~~ Murnaroo No. 1 petrography

5339 RS5-9.

Investigation and Report by: Dr Brian Steveson

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley.

for Norton Jackson,
Managing Director.

RECEIVED
4 DEC 1978
DEPT. OF MINES AND ENERGY SECURITY

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4 APR. 79.

SOURCE-ROCK STUDIES - SEDIMENTARY BASINS

Sample: RS5; TSC20966

Location:
Murnaroo No. 1; 161.61 to 161.65 m.

Rock Name:
Thinly-bedded calcareous siltstone

Hand Specimen:
The sample is a grey rock which is essentially aphanitic. There is a very faint banding at a high angle to the core length.

Thin Section:
The bulk of this rock is extremely fine-grained and consists of a turbid aggregate of clay, calcite and dispersed ferruginous material. Under crossed nicols the material is very dark but there are slightly clearer patches within which calcite can certainly be distinguished. It is impossible to determine with accuracy the relative proportions of the minerals present, particularly that of clay. The darkness of the material certainly suggests that there is some possibly kaolinitic material present with the calcite. This part of the rock is generally homogeneous and the banding of the rock is due to variations in the amount of silty material.

In the sample overall silt probably comprises about 10-15% of the rock but it is generally concentrated in fairly well defined thin beds. These beds are commonly only about 0.2 mm in width and they contain abundant quartz and mica. These minerals generally form angular crystals not more than 0.03 mm in overall size. The mica is generally clear muscovite but there is a little fresh biotite also. The flakes have a parallel alignment concordant with the bedding in the sample. There is only a little dispersed clay and calcite in the silty beds. Most of the beds are perfectly straight in thin section but show some tendency to pinch out. In the bulk of the rock similar silt material is widely dispersed and there are many fields of view containing less than 5% of such material. Mica flakes are possibly as abundant as quartz in this part of the rock and they form clear streaks when the material is viewed in plane polarized light.

There are a few concentrations of opaques and these are generally equant and not more than about 0.15 mm in size. Some may be plant debris but some of the more equant patches may well be ferruginous oxide/hydroxide.

Sample: RS6; TSC20967

Location:
Murnaroo No. 1; 182.36 to 182.40 m.

Rock Name:
Dolomite

Hand Specimen:
The sample is a fine-grained, grey rock with a laminar banding at right angles to the core length.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Dolomite	95
Quartz	2
Opaques	1-2
Calcite	<1
Mica	Trace

This is essentially a homogeneous rock and consists of a massive aggregate of micritic dolomite. Only in one place in the thin section is a more sandy bed present.

In the bulk of the rock the dolomite forms crystals not more than 0.03 mm in diameter and commonly distinctly smaller than this. In most fields of view there are one or two aggregates of opaques and crystals of quartz but the dolomite forms an essentially homogeneous, tightly locked aggregate with an even texture and crystal size.

Within the dolomite there are a few rather lensoid and whispy aggregates of opaques commonly not more than 0.1 mm in length and ranging down to virtually submicroscopic spots. Some of the material may be sulphide (there are equant aggregates) but the more ragged and elongate aggregates may be ?plant material. Quartz grains and mica flakes are generally extremely small and are within the silt-grade grain size range.

In one place in the thin section there is a bed probably best regarded as a dolomitic silt. It consists of sub-equal amounts of dolomite and quartz forming crystals generally of the order of 0.03 mm in size. The quartz is probably original detrital material partly resorbed and corroded by dolomite. The latter forms fairly well-defined, clear crystals. Throughout the rock there are trace amounts of detrital heavy minerals and one or two grains of zircon were specifically identified.

The sample is a dolomite which has a massive granular texture and shows no pseudomorphs of the original material apart from one band which appears to be a dolomitic siltstone. Calcite is present in one or two places and is associated with discontinuous carbonate veinlets and hence, probably post-dates the bulk of the dolomite.

Sample: RS7; TSC20968

Location:
Murnaroo No. 1; 186.33 to 186.37 m.

Rock Name:
Dolomite

Hand Specimen:
A grey, aphantic rock showing very thin banding at a high angle to the core length. There are some irregularities in the banding but it is essentially laminar.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Dolomite	95
Quartz	3
Opaques	1-2
Mica	Trace

The rock shows irregular and ill-defined banding delineated mainly by variations in the crystal size of the dolomite. Despite this, the rock is essentially homogeneous and consists principally of a micritic mosaic of dolomite with silt-grade and smaller terrigenous silicate fragments.

Much of the dolomite in the rock is present as a micritic aggregate with a crystal size which is probably less than 0.02 mm. In most fields of view there are individual crystals or indefinite patches of dolomite up to about 0.04 mm in size. In one place in the thin section there is also a group of coarser-grained dolomite patches and these contain crystals up to about 0.15 mm in size. The patches themselves are generally of the order of 1 mm in length.

The rock contains a slightly varying amount of detrital quartz but this is never more than about 7% of the volume of the rock and few grains are more than about 0.04 mm in diameter. The quartz occurs as angular but irregular fragments, many of which have probably been partly corroded by the dolomite. There are also widely dispersed flakes of muscovite and one or two green flakes which may well be chlorite.

Opaques are widely disseminated throughout the rock and occur mainly as either extremely fine-grained dusty material (commonly associated with coarse-grained dolomite) or rather more coherent but elongate patches which may be carbonaceous rather than, for example, sulphide. Few coherent patches of opaques are more than 0.1 mm in size.

The sample is a micritic dolomite with, in places, patches of later coarse-grained material. There is a sparse terrigenous component and a little opaque material which may well be carbonaceous. The sample shows a fine-grained bedding which, although essentially laminar, does show lensing of beds and other slight irregularities.

Sample: RS8; TSC20969

Location:
Murnaroo No. 1; 216.23 to 216.27 m.

Rock Name:
Dolomitic siltstone

Hand Specimen:
This sample shows laminar banding at 90° to the core length. The beds are extremely thin (less than 1 mm). The rock is grey and aphanitic.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz and feldspar	45
Dolomite	30
Clay	?10-20
Mica	7-10
Opaques	5

Apart from one lens of sandy material (described below) the sample is a homogeneous siltstone with authigenic dolomite. Quartz and minor amounts of potassium feldspar are present as angular chips less than 0.04 mm in size and commonly less than 0.02 mm. The material appears to be moderately to well sorted. Potassium feldspar was specifically identified and is generally fresh and it is possible that the rock contains a little sericitized plagioclase, although an unambiguous identifieation could not be made. Mica is present both as biotite and muscovite with rather more of the latter than of the former. Both minerals form well defined flakes up to about 0.12 mm in length. The biotite shows pleochroism and high birefringence colours and appears to be perfectly fresh. Opaque material commonly forms rather indefinite lenses which have a similar parallel orientation to that of the mica flakes. Also present are equant but rather diffuse patches up to about 0.05 mm in size. Some of this material shows red colours under intense illumination and is probably ferruginous, but elsewhere the material is completely opaque and may be carbonaceous.

Much of the intergranular space is occupied by small crystals of dolomite which is clearly of authigenic origin; clay is also present but it is difficult to give an accurate estimate of the amount of this mineral because of the fine-grained nature of the material and the fact that the clay (if present) is of a low birefringence and low refractive index.

The thin section contains one lens of sandstone. This is about 0.5 mm in width and approximately 10 mm in length. It consists almost entirely of quartz cemented by secondary silica overgrowths. The average grain size of the quartz is about 0.15 mm. Also present in this bed are a few slightly altered grains of feldspar (also with overgrowths) and one or two patches of clay which may represent lithic fragments.

The sample is a typical argillaceous and micaceous siltstone containing, in this case, widely dispersed, fine-grained, authigenic dolomite. There is also one bed of quartz sandstone.

SAmple: RS9; TSC20970

Location:
Murnaroo No. 1; 229.39 to 229.43 m.

Rock Name:
Silty and dolomitic shale

Hand Specimen:
This is a rather soft grey rock which is aphanitic and massive.

Thin Section:
It is rather difficult to give an estimate of mineralogy of the sample since the rock is so fine-grained, but it appears that the bulk of the material is probably clay and that there is of the order of 10-20% each of dolomite, quartz, and mica. Apart from one or two sandier lithologies the rock is homogeneous and massive.

In the bulk of the rock grains of quartz and mica and crystals of dolomite do not commonly exceed 0.02 mm in size and are generally distinctly smaller than this. The quartz grains are equant but distinctly angular and many have probably been corroded by adjacent clay or dolomitic material. Phyllosilicate flakes are randomly oriented and are commonly colourless and probably consist of mica or illitic material. There is a little biotite which, as in other rocks in this group, is generally fresh. Dolomite forms moderately well defined crystals generally not larger than the grains of quartz. The dolomite crystals are interpreted as being of authigenic origin on the basis of their angularity and by the fact that the dolomite tends to occur as single crystals rather than fine-grained aggregates. These components occur in a matrix which is dark between crossed nicols and essentially colourless in plane polarized light. This is thought to consist of clay material but more specific identification would require X-ray diffraction analysis.

Minor components of the rock are widely dispersed traces of opaque material forming, in places, diffuse aggregates up to 0.1 mm in size. There are also a few patches of a pale green mineral which may well be glauconite. These patches are generally equant to slightly oval in shape and as much as 0.2 mm in size.

The rock contains a few sand-grade grains of quartz and feldspar in rather indefinite beds. These beds are not more than about 0.4 mm in width and the sand-grade grains are closely intermixed with the fine-grained material described in the paragraphs above. The larger grains appear to be fairly well sorted but many are distinctly angular in shape.

DEPARTMENT OF MINES AND ENERGY - SOUTH AUSTRALIA

APPLICATION FOR EXAMINATION OF SPECIMENS OR SAMPLES

UNIT NUMBER 1:100,000 SHEET	RS	Number	Applicant's Number	Descriptive Information; Drillhole, Survey etc.	Details of work required	Estimated Cost
5339	RS	5	161.61 - 161.65	MURNAROO No 1 borehole	Routine petrography (MA 1.3)	$27
↓	↓	6	182.36 - 182.40	MURNAROO 1:100,000 sheet	↓	"
		7	186.33 - 186.37	29°01'25" S ; 132°01'35" E		"
		8	216.23 - 216.27			"
		9	229.39 - 229.43			"
						"
					Total	$135.00

Type of Samples: CORE

Disposal of Samples: RETURN TO C.G.G. & RETURN T/S.

Name of Applicant: C.G. GATEHOUSE

Address: FOSSIL FUELS DIVISION

Signed: C.G. Gatehouse Date: 7/11/78

OFFICE USE ONLY

Submitted to AMDEL for - ~~Analytical,~~ Petrological, ~~Other Examination~~

Firm/Estimated Price: $135.00

Charge against Project No.: 11.06.368

Approved: per Director General

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Copy 2 : T.I. Services
Copy 3 : Originator
Copy 4 : Glenside Core Lib.