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25 May 1989

CRA Exploration Pty Ltd
PO Box 38
ALICE SPRINGS NT 0871

Attention: Mr A Kress

REPORT F 7531/89 - Part 2

CLIENT REF:	DPO No 37327
TITLE:	Core Analysis
IDENTIFICATION:	Sample Numbers 2557269 - 2557275
MATERIAL:	Core
WORK REQUIRED:	Bulk Dry Density Saturated Density

Investigation and Report by: Russell R Martin

Manager, Petroleum Services Section: Dr Brian G. Steveson

for Dr William G. Spencer
General Manager
Applied Sciences Group

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1. INTRODUCTION

Seven core samples numbered 2557269 through 2557275, were received by the Petroleum Services Section of Amdel Limited. Samples were provided for Absolute Grain Density determinations by pycnometry, and two samples (2557269 and 2557273) required thin section preparation, together with routine Petrographic Descriptions. Results of this work were contained in Amdel Limited's report F 7531/89 dated 21 April 1989.

Further to the above work, Mr A Kress of Pacific Oil and Gas requested bulk dry density and saturated density measurements be performed.

2. BULK DRY DENSITY

A section of sample was taken from the core samples provided and dried in a conventional dry oven at 80 °C. Bulk volume measurements were then performed on the samples by mercury immersion. In addition to bulk dry density saturated density was also required assuming a density of saturating fluid of 1.1.

Calculations:

1) Bulk volume x Dry Bulk Density = Sample Weight

2) Sample Weight/Grain Density = Sample Grain Volume

3) Bulk Volume - Grain Volume = Sample Pore Volume

4) [(Sample Pore Volume x ρ of saturating fluid + (Dry Sample Weight)] = Saturated Sample Weight

5) Saturated Sample Weight/ Bulk Volume = Saturated Bulk Density

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Report F 7531/89

DENSITY DETERMINATIONS

Company: Pacific Oil and Gas

Samples: 2557269 through 2557275

Sample Number	Bulk Volume cc's	Dry Bulk Density gms/cc	Grain Density gms/cm	Saturated Bulk Density gms/cc
2557269	12.31	2.63	2.64	2.63
2557270	8.32	2.56	2.71	2.62
2557271	9.12	2.60	2.66	2.63
2557272	6.67	2.64	2.67	2.65
2557273	3.05	2.67	2.76	2.72
2557274	6.66	2.60	2.63	2.61
2557275	4.70	2.69	2.74	2.71

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21st April 1989

CRA Exploration Pty Ltd
Private Bag 509
BOX HILL VIC 3128

Attention: Mr I Clementson

REPORT F 7531/89

CLIENT REF:	DPO 37327
TITLE:	Core Analysis
IDENTIFICATION:	Sample Numbers 2557269 - 275
MATERIAL:	Core
WORK REQUIRED:	Absolute Grain Density Petrographic Description

Investigation and Report by: Russell R Martin and Doug Mason

Manager, Petroleum Services Section: Dr Brian G. Steveson

for Dr William G. Spencer
General Manager
Applied Sciences Group

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1. INTRODUCTION

Seven core samples, numbered 2557269 through 2557275, were received by the Petroleum Services Section of Amdel Limited. Samples were provided for absolute grain density determinations by pycnometry, and two samples (2557269 and 2557273) required thin section preparation together with routine petrographic descriptions. As requested an additional thin section was made from sample number 2557273.

2. ABSOLUTE GRAIN DENSITY

Approximately 15 grams of samples is crushed to grain size and placed into an accurately calibrated pycnometer and weights recorded. Industrial grade methylated spirits of known specific gravity is then used to fill the pycnometer. A vacuum is applied for a short period to expell all air and the pycnometer filled to the top. Weight of the full pycnometer and temperature are recorded. Absolute grain density is then calculated at a standard temperature of 20 °C.

3. PETROGRAPHIC DESCRIPTIONS

Conventional thin sections (TS C51623 - 25) were prepared from the samples provided and petrographic descriptions performed using conventional transmitted light microscopy.

ABSOLUTE GRAIN DENSITY

Company: CRA Exploration Pty Ltd

Well Name	Depth (m)	Sample Number	Grain Density gms/cc
Bradley 1	904.4	2557269	2.64
Phillip 2	1493.0	2557270	2.71
Hacking 1	1233.5	2557271	2.66
NTGS Elk 6	845.9	2557272	2.67
Lucy Creek 1	1105.5	2557273	2.76
Huckitta 1	1180.5	2557274	2.63
Sandover 13	1012.0	2557275	2.74

3. PETROGRAPHIC DESCRIPTIONS

SAMPLE: 2557269: TSC51623 Bradley 1 904.4m

Rock Name:
Altered Biotite Granite

Hand Specimen:
The rock chip represents a "red granite". It is massive, medium grained, and feldspars are tinged pale pinkish-brown or dark brownish-red. Quartz remains translucent grey, and minor dark ferromagnesian aggregates are scattered throughout.

Petrography:

Mineral	Vol. %	Origin
Plagioclase	26	relict igneous
K-feldspar (orthoclase)	27	igneous
Quartz	30	igneous
Biotite	2	relict igneous
Opaques (?magnetite)	1	igneous
Zircon	Tr	igneous
Apatite	Tr	igneous
Chlorite	6	alteration
Leucoxene	1	alteration
Sphene	Tr	alteration
Opaques (incl. goethite)	2	alteration
Sericite	5	alteration
Calcite	Tr	alteration

In thin section, this sample displays a medium grained, massive, hypidiomorphic granular texture, partly modified by alteration.

Clear quartz is abundant. It forms subhedral independent grains (average size ~1.2 mm) and anhedra graphically intergrown with orthoclase.

Plagioclase builds subhedral prisms (average size ~2 mm) that tend to aggregate into groups. Alteration is extensive, with small flecks of sericite and dustings and anhedral aggregates of fine-grained goethite.

K-feldspar (orthoclase) forms anhedral grains that are mostly fresh, but display weak alteration by cryptocrystalline ?clays.

Dark brown biotite was the dominant primary ferromagnesian phase. It forms ragged flakes and aggregates up to 1.5 mm in size. It is mostly replaced by green chlorite with associated granules of leucoxene, rare sphene, minor opaques and calcite.

Primary opaque subhedra (?magnetite) have been partly replaced by leucoxene, but other accessory primary phases are fresh (equant zircon prisms, stumpy apatite prisms).

This rock represents a granitic magma that cooled slowly at a moderate crustal depth to generate the igneous assemblage quartz + plagioclase + orthoclase + biotite + magnetite (± zircon ± apatite). Subsequent deuteric alteration caused almost complete chloritisation of biotite, and partial sericitisation of plagioclase may have occurred at this time. After uplift and erosion, near-surface alteration by meteoric waters caused extensive replacement of plagioclase by goethite and incipient ?clay alteration of orthoclase.

SAMPLE: 2557273: TSC51625-25 Lucy Creek 1 1105.5m

Rock Name:
Quartzo-Feldspathic Hornblende Gneiss

Hand Specimen:
The two rock chip samples are similar in appearance. They represent a fine-grained, uniform, dark rock composed mainly of pinkish altered feldspar and black ferromagnesian grains. A moderately developed preferred orientation of the mafic grains generates a lineation.

Petrography:

Mineral	Vol. %	Origin
Plagioclase	26	metamorphic
K-feldspar (microcline)	25	metamorphic
Quartz	20	metamorphic
Hornblende	15	metamorphic
Opaques	3	metamorphic
Biotite	2	metamorphic
Apatite	Tr	
Chlorite	5	alteration
Fe-oxides (?goethite)	3	weathering
Calcite	1	vein

In thin section, this sample displays an even-grained granoblastic metamorphic texture, with weak preferred orientation (lineation) of hornblende prisms.

Feldspars dominate the mineralogy. Plagioclase and K-feldspar (microcline) occur in granoblastic association with clear anhedral quartz (average size ~0.2 mm). Although the felsic phases are mostly fine- and even-grained, rare larger grains (up to ~0.2 mm) are present. Larger plagioclase prisms are subhedral and zoned but larger microcline and quartz occur as anhedral aggregates.

Hornblende is the dominant ferromagnesian phase. It forms dark green to brown pleochroic anhedra (average size ~0.2 mm) that tend to build loose aggregates, and in places are moderately well lineated.

Subhedral to anhedral opaque grains (?magnetite) commonly occur as inclusions within hornblende. Other minor phases include dark brown biotite flakes and small apatite prisms.

Alteration has generated green chlorite, traces of calcite (which also occurs as a thin discordant fracture filling), and patches of cryptocrystalline reddish-brown iron oxides (?goethite).

The rock represents a quartzo-feldspathic hornblende gneiss of intermediate to acid bulk composition. It recrystallised under conditions of medium grade dynamic regional metamorphism. The nature of the precursor rock is difficult to determine, but the presence of larger zoned plagioclase prisms, possible relict phenocrysts, suggests that the primary rock was magmatic. If so, the abundance of ferromagnesian minerals and K-feldspar suggests it may have been a high-K quartz diorite.