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The Director,
Department of Mines,
PO Box 51,
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Petroleum Geology Section

REPORT MP 1307/76

YOUR REFERENCE:	Amdel application of 26-10-75
MATERIAL:	Various side-wall cores and rocks
LOCALITY:	Appollo #1, Gemini #1, Eyre Peninsula
DATE RECEIVED:	27-10-75
WORK REQUIRED:	Brief petrography and comparison

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Director

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SAMPLES FROM APOLLO #1 AND GEMINI #1

1. INTRODUCTION & METHODS

Two samples from Apollo No. 1 (2842 and 2860) were examined by binocular microscopy for the South Australian Mines Department on 26th October 1975. Subsequently these samples and side-wall samples from Gemini No.1 were examined at Amdel. On Wednesday the 10th of December 1975 the client submitted one relatively large chip sample from Gemini No.1 (2932'), various volcanic rocks for comparison with the Gemini No.1 samples and some arkosic rocks for comparison with samples obtained from Apollo No.1.

Essentially the client is interested in the nature of the rocks and their possible correlations with known lithologies from the South Australian mainland.

At Amdel the chippings from the wells were washed (by wet sieveing at 400#) and dried and the +400# material was separated in tetrabromoethane (sp.gr. 2.96). This procedure was adopted since it was considered that the heavy minerals in the Apollo No.1 sample especially would be more indicative of the petrology. All products were examined by binocular microscopy.

The samples submitted for comparison with the Apollo No.1 rocks were crushed to -36#, washed and separated in tetrabromoethane and the heavy products were compared with the heavy products obtained from the drill chipping.

Thin sections were prepared from the large fragment from Gemini No.1 and from three of the volcanic rocks with which it was to be compared.

2. RESULTS

2.1 Gemini No.1

The four chipping samples from the well (2870'-2900') consist largely of albitic feldspar with minor amounts of epidote and chlorite. Many grains in the washed cuttings are obscured by brown clayey material and X-ray diffraction methods were used to confirm that this material consists essentially of sodic feldspar. Chlorite forms dull green anhedral chips which are probably polycrystalline whereas epidote is present as equant, angular crystals which are clear and have a well-developed yellow-green colour. Other phases in the cuttings are black grains, some of which may be prismatic crystals of amphibole.

This mineral assemblage is very characteristic of highly altered basic volcanic rocks in which sodium/potassium feldspar has been altered to albite and original pyroxene has been replaced by epidote and chlorite. No evidence of rounding of the fragments were seen and hence it is concluded that the sample is a highly altered basic igneous rock, probably of volcanic origin.

The large chip obtained from 2932' consists principally of coarse-grained granular calcite and crystals of quartz and feldspar. The quartz and feldspar together comprise approximately 20% of the rock. Some of the feldspar is well twinned microcline and this appears to be the predominant feldspar type. The rock

contains a few small flakes of muscovite and biotite in a decussate arrangement. From this description it will be clear that this rock is dissimilar from the chippings and it is likely that the sample has been preserved because it is unusually well cemented by calcite; alternatively the sample may be a contaminant from an adjacent lithology.

Sample P246/75 is a volcanic rock submitted for comparison with the Gemini No.1 sample. The rock contains numerous phenocrysts of quartz and altered feldspar and the groundmass consists of fine-grained quartz and abundant fine to medium-grained sericite. The rock appears to contain no chlorite or epidote.

Sample P478/67 is an extremely altered volcanic rock which now contains a significant amount of secondary carbonate and chalcedonic silica as well as patches of calcite and fine-grained chlorite. Much of the chlorite and some of the chalcedony occurs in circular structures which are probably altered vesicles. The rock contains neither epidote nor albite but does contain abundant dolomite and hence it appears to have little in common with these samples from Gemini No.1.

Sample P469/76 consists largely of phenocrysts of quartz and feldspar with a rather subordinate groundmass with a similar mineralogy. Untwinned potassium feldspar is the most abundant phenocryst phase. This sample, also, contains neither albite nor epidote and there are only traces of chlorite and, therefore, the rock is not similar to the samples of volcanic rock from Gemini No.1.

These comparisons with three samples from the Roopeena volcanics suggests that the mode of alteration, at least, is different; the Gemini samples are characterized by the presence of relatively abundant albite and epidote whereas the three samples from the Roopeena volcanics have different alteration patterns, particularly in that they show the development of sericite, carbonate and secondary silica.

2.2 Apollo No.1

The heavy mineral products from the two samples supplied were combined in order to produce a reasonable amount of material. There is insufficient biotite even in the combined products for potassium argon geochronology.

Apart from angular and splintery particles of (?secondary) iron oxide/hydroxide the most abundant heavy mineral is garnet; both a pink and an orange type were recognized. Some of the garnet grains are subangular and appear to have been transported; furthermore, some grains are distinctly frosted.

Much of the quartz is present as angular, broken fragments but some sub-angular detrital grains are present. A few dark green rounded grains were broken and examined on a petrographic microscope; these grains consist of fine-grained random aggregatesof a green birefringent phyllosilicate which is likely to be glauconite. As a result of these studies it is concluded that this rock is a sediment; the fractured nature of the quartz crystals several tenths of a millimetre in size suggests that the rock is coarse-grained. Fresh feldspar has not been observed and hence the rock is either a relatively pure quartz sandstone or detrital feldspar has been weathered to clay which has been washed out. The detrital heavy minerals consist very largely of garnet (?from a proximate source rich in metamorphic rocks).

The samples sent for comparison consist of conglomeratic and arkosic

sediments from the Blue Range conglomerate. Some samples appeared to be collected from the vicinity of Ningana Homestead and others from Verran. Four selected samples were crushed to -36#, washed and separated in tetrabromoethane (sp.gr.2.96). The heavy and light products were examined by conventional transmitted light techniques.

The heavy products consist largely of opaque minerals with moderate amounts of tourmaline and zircon; garnet was not specifically identified in any of these samples. The absence of garnet strongly suggests that these samples are not closely related to the garnetiferous rocks obtained from Apollo No.1. Examination of the light products of these four samples showed that they consist very largely of angular quartz fragments with a little subangular to subrounded glauconite in the sample marked Ningana 4.

In brief, therefore, the results suggest that these samples, supplied for comparison, are dissimilar from the unusually garnetiferous rocks intersected in Apollo No.1.

All samples are being held at Amdel in case further work is required.