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9th July, 1984
WES/dh

Department of Mines and Energy,
G.P.O. Box 2901,
DARWIN, N.T., 5794

Attn. Ms. S.H. Hickey

608 St. Kilda Road,
Melbourne, Victoria, 3004
Australia.
Telephone: 529 4122
Telex: AA32159 UGAMEL.

884-02-04

Dear Ms. Hickey,

We refer to your letter dated 25/6/84 to our Regional Office in Darwin.

As the requested drill material relating to the South Alligator Stratigraphic hole DDH2, on the Alligator River 1:250,000 map sheet was not incorporated as part of an exploration report for the Department, we now enclose a copy of the sampling results for your file.

Yours faithfully,
URANGESELLSCHAFT AUSTRALIA PTY. LTD.

W.E. Schindlmayr

W.E. SCHINDLMAYR
Managing Director - Technical

OPEN FILE

Enclosure

cc: J.P. - Darwin Office

NORTHERN TERRITORY
GEOLOGICAL SURVEY

CR84/156

Central Mineralogical Services



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Dr. B. Beerbaum
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30th September, 1983

REPORT CMS 83/9/4

YOUR REFERENCE: Order No. 4576
 Project No. 884
 Cost Code No. 061220

DATE RECEIVED: 5th September, 1983

SAMPLE NOS.: 44 Samples

SUBMITTED BY: Dr. B. Beerbaum

WORK REQUESTED: Petrology

H.W. Fander

H.W. Fander, M. Sc.

REPORT CMS 83/9/4

Alligator Rivers Area Rocks

Two suites of samples were received, numbered LTS 1/1 to 14/1 (21 hand specimens), and LTS C-1 to C-23 (drill core from NTDME S. Alligator No. 2), for thin-section and rock slab preparation and petrological description. Various types of stain tests were applied where necessary. Slabs were prepared as necessary; in the case of the core samples, where samples were limited, the actual offcut from the thin-section was used to prepare the varnished slabs.

The most suitable adhesive for this purpose is a "contact cement" available in a variety of brand names, e.g. Selley's Kwikgrip; this cement is permanent, waterproof and flexible, but can be dissolved in petrol or turpentine if necessary; it is freely available in all hardware stores.

Comments

1. Hand Specimens

The specimens representing the Gerowie Tuff unit show no evidence of pyroclastic or other volcanic components; two are low-grade carbonaceous metasediments and one is an unmetamorphosed chemical sediment.

The unmetamorphosed siltstone (2/1) representing the Wildman Siltstone, raises the question whether unmetamorphosed Lower Proterozoic rocks exist.

The Mt. Hooper Sandstone (3/1) is petrologically very similar to the Kombolgie Sandstone, e.g. at Ranger.

Of the representatives of the Cahill Formation, 14/1 is very typical of much of this formation examined for several companies over a period of many years; 14/2 is quite atypical, and 14/3 is very questionable.

Both the Munmarlary "quartzites" (7/1-2) are in effect gneisses, and the name "Quartzite" is thus incorrect.

2. Cahill Formation Drill Core

This suite includes a wide variety of rock types, mostly metasediments, but with the possibility of meta-igneous amphibolites.

The metasediments comprise dolomitic marbles with talc/phlogopite and tremolite, rarely diopside, as well as gneisses, schists, amphibolites and calc-silicate rocks transitional to marbles. Metamorphism ranges from greenschist to amphibolite facies, but cannot always be accurately determined, because of the absence of diagnostic minerals; there is some suggestion of two metamorphic episodes, possibly a late thermal episode due to a nearby intrusive. Also, retrograde metamorphism is evident and is a low-temperature hydrothermal effect.

The amphibolites present the usual difficulties of determining their origin, i.e. whether sedimentary or igneous; this is a common problem with amphibolites and can often be resolved by studying the relationships with the adjacent rocks.

H.W. Fander, M. Sc.

Sample no.	Rock Type - Composition	Fabric	Minor Minerals	Comments
LTS C-1	<u>Silicified ?Carbonate Rock</u> . Now consists entirely of SiO_2 as quartz and chalcedony, mostly finely granular to fibrous, with pseudomorphous textures accentuated by limonite.	Evidence of brecciation and shearing. Some pseudomorphs after carbonate.	Limonite films, small MnO_2 streaks. Younger clear quartz veins.	Present textures are difficult to relate to original rock, but are generally characteristic of silicified coarsely-crystalline carbonate.
-2	<u>Dolostone</u> . Dominantly composed of small polygonal dolomite crystals, with scattered quartz grains, aligned chlorite flakes; interstitial fine limonite. Incipiently altered.	Very uniform medium/fine-grained fabric with distinct preferred orientation; bedded.	Thin quartz-mica laminations, with introduced replacive calcite and quartz.	Carbonate stain test indicates dolomite, with calcite and quartz development along partings. Diagenetically recrystallized, but little evidence of metamorphism.
-3	<u>Talcose Marble</u> . Small interlocking and polygonal crystals of dolomite, subordinate calcite; scattered parallel flakes of chloritised talc; a few tremolite porphyroblasts.	Generally fine uniform granular fabric with coarser bands. Good preferred orientation.	A few small quartz patches associated with tremolite.	Low-grade regional metamorphism (greenschist facies) of a mixed carbonate rock. Simple composition and structure.
-4	<u>Tremolite-Chlorite Marble</u> . Interlocking granular crystals of dolomite and subordinate calcite; small parallel chlorite (?altered talc) flakes and partly altered tremolite porphyroblasts.	Uniform medium-grained fabric with good preferred orientation. Coarser bands.	Secondary quartz and talc associated with altered tremolite.	Closely resembles C-3, with more chlorite and tremolite. Carbonate test is helpful in defining the species and distribution.
-5	<u>Tremolite-Chlorite Marble</u> . Dominantly elongate polygonal dolomite crystals, minor calcite, with embedded small chlorite (?altered talc) flakes and partly altered tremolite porphyroblasts.	Medium-grained, with good preferred orientation, but tremolite is random, up to 10 mm.	Angular quartz fragments. Talc pseudomorphs after tremolite.	Correlatable with C-3 and C-4. Steatitisation of tremolite is a retrograde, postmetamorphic process.
-6	<u>Sericitic Metaquartzite</u> . Dominantly strongly stressed small interlocking quartz grains; patches and bands of fine sericite aggregates representing altered feldspar.	Good preferred orientation and some compositional banding; medium-grained.	Occasional minute carbonate inclusions in quartz.	Probably a clastic sediment such as a feldspathic or laminated argillaceous sandstone originally; metamorphosed to feldspathic metaquartzite, then retrograded.
-7	<u>Banded Calc-Silicate Rock</u> . Granular diopside-metaquartzite grading into massive coarsely crystalline diopside with bands/patches of replacive talc and calcite.	Banding is compositional, reflecting original banding. Medium- to coarse-grained.	Postmetamorphic calcite-sericite veinlets. Isolated small pyrite crystals.	Original rock was probably a siliceous dolostone or banded chert dolostone. Amphibolite-facies regional metamorphism(?), but may be contact-metamorphic.
-8	<u>Biotite Amphibolite</u> . Small subparallel prismatic hornblende crystals, interspersed interleaved biotite flakes, interstitial sericitised feldspar; lenses of altered feldspar.	Typical amphibolite fabric with good lineation; medium-grained. Foliated.	Scattered oxide opaques with sphene. Conformable quartz veins, crosscutting carbonate veinlets.	Believed to be of basic igneous origin, but as with many amphibolites, interpretation must be based on all available data.

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
LTS C-9	<u>Amphibolite</u> . Mainly small prismatic sub-parallel hornblende crystals with interstitial quartz and andesine; quartz-feldspar bands with biotite and a few garnets.	Medium-grained, with good lineation and some compositional banding.	Scattered sphene, oxide opaques, and traces of fine pyrite. Prehnite veinlets.	Zones of argillic alteration adjacent to crosscutting microfractures. Regarded as a meta-sediment, contrasting with C-8(?).
C-10	<u>Diopside-Metaquartzite</u> . Dominantly consisting of coarse interlocking quartz crystals, with parallel stringers of partly altered diopside poikiloblasts and minor tremolite.	Good preferred orientation mainly due to thin, closely-spaced calc-silicate bands.	Diopside altered to, or replaced by, sericite and carbonate. Thin crosscutting calcite veins.	Similar to C-7, but with less diopside, as thin rather than massive bands. Amphibolite-facies meta-sediment, perhaps banded dolomitic chert.
C-11	<u>Diopside Marble</u> . Medium-granular dolomite with small chlorite flakes; broad zones of coarsely-crystalline diopside, extensively replaced by talc and calcite; sporadic tremolite needles.	Compositionally banded. Calcite metasomatism has obliterated marble fabric.	Quartz lenses and bands within coarse diopside. A few patches of andradite garnet.	The banding reflects original compositional variations, and rock may be related to C-7 and C-10, i.e. metamorphosed chemical sediment.
C-12	<u>Graphitic Schist</u> . Interleaved muscovite and degraded biotite, granular feldspar, quartz, poikiloblastic cordierite; lenses of coarse diopside-tremolite (altered); scattered pyrite porphyroblasts. Fine graphite.	Fine/medium-grained schistose fabric with lenseoid structures. Cross-fractures.	Carbonate patches, veinlets. A few large sphene crystals. Diopside replaced by sericite-carbonate.	Complex mineral assemblage, partly regional, partly contact-metamorphic with younger pyrite (and ?chalcopyrite). Metasediment.
C-13	<u>Quartz-Feldspar-Mica Schist</u> . Interlocking platy crystals of quartz and fresh oligoclase, coarser quartz lenses. Interleaved muscovite and chloritised biotite flakes.	Crude schistosity, coarse fabric verging on gneissic. Discontinuous foliation.	Secondary leucoxene in chloritised biotite. A few fresh biotite flakes.	Upper greenschist or possibly lower amphibolite facies meta-sediment, straightforward and featureless.
C-14	<u>Amphibolite</u> . Apart from wide quartz vein, virtually massive amphibole, as prismatic crystals of dark ferrohastingsite with very minor interstitial quartz, sericitised feldspar.	Good lineation, generally medium-grained, with coarse pegmatoid vein.	Vein is dominantly quartz, with coarse sericitised feldspar, magnetite, trace sulphide. Apatite, sphene.	Almost monomineralic rock, with unusual amphibole; thought to be a metasediment. Quartz vein may be a segregation.
C-15	<u>Garnetiferous Quartz-Feldspar-Mica Gneiss</u> . Lenseoid quartz-oligoclase masses, with foliations of coarse interleaved muscovite and chloritised biotite. Small garnets sprinkled throughout.	Typical gneissic fabric; medium- to coarse-grained textures. Occasional larger lenses.	Occasional small patches of fine sericite aggregates.	Amphibolite-facies metasediment. Fresh except for selective chloritisation of biotite. Broadly similar to C-13.
C-16	<u>Quartz-Feldspar-Mica Gneiss</u> . Mostly medium-grained interlocking quartz and oligoclase, scattered muscovite and chloritised biotite; coarser lenses, with sericitised fibrous sillimanite.	Lenses of very coarsely-crystalline minerals in generally uniform medium-grained rock.	Isolated detrital zircon grains. Crosscutting chlorite veinlets.	Retrograded amphibolite facies metasediment, but diagnostic features of sillimanite are well-preserved.

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
LTS C-17	<u>Amphibolite</u> . Mainly thin prismatic crystals of dark hornblende, with interspersed quartz and sericitised plagioclase grains; garnet poikiloblasts in more quartzose bands.	Excellent lineation, medium- to coarse-grained fabric. Garnet crystals up to 3 mm.	Magnetite throughout. Crosscutting prehnite veins with associated pyrite. Chloritised biotite.	Believed to be a para-amphibolite, i.e. of sedimentary origin, but dependant on relationships to adjacent rocks.
C-18	<u>Chloritised Amphibolite</u> . Pseudomorphs of chlorite (with secondary leucoxene) after amphibole, with quartz and altered feldspar, small patches of K-feldspar. Broad alteration zones.	Typical medium-grained amphibolite fabric and relict hornblende textures.	Crosscutting alteration zones consist of fine chlorite/sericite, fresh and argillised prehnite needles.	Interpretation based on relict textures and on alteration assemblage. Origin not known. Pervasive chloritisation, younger alteration.
C-19	<u>Amphibolite</u> . Dominantly coarse prismatic hornblende crystals, often in bundles, with minor interstitial sericitised feldspar and occasional quartz grains.	Excellent lineation; some crystals up to 5 mm long. Uniform, with a few lenses.	Scattered sphene and magnetite. Veins of prehnite with embedded albite crystals.	Origin uncertain because mineral assemblage is not specific; sedimentary origin favoured, but subject to field data.
C-20	<u>Quartz-Feldspar-Biotite Gneiss (Sheared)</u> . Very large interlocking plates of stressed quartz and oligoclase (deformed twin-lamellae), contorted chloritised biotite flakes with secondary leucoxene.	Confused fabric due to shearing; coarsely gneissose, with medium-grade patches.	Replacive sericite, pale chlorite. Sheared prehnite in pre-tectonic veins. Younger chlorite veinlets.	Clear evidence of a postmetamorphic tectonic event. Rock is upper greenschist/lower amphibolite facie metasediment.
C-21	<u>Talcosed Marble/Schist</u> . Granular dolomite with talc flakes, steatitised tremolite, separated from a fine quartz-feldspar-biotite schist by a zone of coarse phlogopite with yellow dravite.	Some shearing, with rafts or detached fragments of schist enveloped by phlogopite. Medium-grained.	Pervasive calcite, and calcite veinlets. Feldspar lenses in schist. Trace pyrite, chalcopryrite.	The phlogopite/dravite zone may be a low-temperature metasomatic phenomenon localised at schist/marble contacts.
C-22	<u>Talc-Tremolite Marble</u> . Granular dolomite, with embedded fine parallel talc flakes, porphyroblasts of steatitised tremolite; bands of foliated phlogopite with tremolite.	Micaceous bands are schistose, remainder is well-orientated, but granular.	Calcite is common as small grains and as pervasive patches (?two generations).	Believed to have been a calcite/dolomite marble, like C-3/5, with younger calcite in addition. Retrograded.
C-23	<u>Phlogopitic Dolomite Marble</u> . Almost entirely composed of interlocking dolomite crystals, interspersed minor calcite, flakes and small lensoid aggregates of pale phlogopite.	Very uniform granular fabric, with thin parallel streaks of phlogopite. Medium-grained.	Traces of ultrafine pyrite. Isolated altered tremolite porphyroblasts.	Phlogopite proxies for talc - very similar composition. Calcite is regarded as primary, i.e. premetamorphic.
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