65/92
COPY
3

~~Copy 2~~

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

65
19~~64~~/92

MISCELLANEOUS CHEMICAL, PETROGRAPHIC, AND MINERAGRAPHIC INVESTIGATIONS CARRIED OUT IN THE GEOLOGICAL LABORATORY.

PART II. MID JULY-DECEMBER, 1964.

Compiled by

J.A.McKenzie.

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

MISCELLANEOUS CHEMICAL, PETROGRAPHIC, AND MINERAGRAPHIC INVESTIGATIONS CARRIED OUT IN THE GEOLOGICAL LABORATORY

JANUARY - DECEMBER 1964

Compiled by
J.A. MacKenzie

Records 1964/92

INTRODUCTION

This Record is composed of reports on minor chemical, petrographic, and mineragraphic investigations carried out in the Geological Laboratory, Bureau of Mineral Resources, during the period January 1964 to December 1964. The Record is divided into two parts; the first deals with reports, covering the period January to mid-July 1964. The second part deals with reports covering the period mid-July to December 1964. In each part the reports are in chronological order.

The officers responsible for work in this Record are W.M.B. Roberts (Geologist, Class III), A.D. Haldane (Chemist, Class III), J.R. Beevers (Chemist, Class II), S.C. Goadby (Chemist, Class II), W.R. Morgan (Geologist, Class I), W. Oldershaw (Geologist, Class I), S. Baker (Chemist, Class I), E.J. Howard (Chemist, Class I), N.J. Marshall (Chemist, Class I), I.R. Pontifex (Geologist, Class I), N.W. Le Roux (Chemist, Class I).

MISCELLANEOUS CHEMICAL, PETROGRAPHIC, AND MINERAGRAPHIC INVESTIGATIONS CARRIED OUT IN THE GEOLOGICAL LABORATORY

PART TWO

MID JULY-DECEMBER 1964

compiled by
J.A. MacKenzie.

65
Records 1964/92

CONTENTS

Report No. 1

28th July, 1964.

183W/1

Spectrochemical Analysis of Samples from Norseman, W.A.

by

A.D. Haldane

The following results were determined by spectrochemical analysis of auger and rock samples from the Norseman area, W.A. obtained from New Consolidated Gold Fields.

All values are expressed in parts per million.

Sample No.	Ni	Co	Cu	V	Mo	Pb
011214	5	10	15	30	5	5-
011215	10	10	30	500	15	a
011216	10	10	50	500	10	a
011217	10	10	30	80	a	5
951	5	a	25	20	5	15
952	15	50	40	150	2	5
953	5-	10	5	10	3	10
954	5-	a	5	50	2	5-
955	20	10	15	30	2	10
956	80	30	2-	80	a	a
957	150	60	50	100	5	5-
958	200	60	70	200	7	5-
959	1500	80	20	80	5	a
960	150	60	80	300	a	a
961	30	a	100	300	10	5-
962	100	5	50	80	5	5-
963	50	50	5	300	2	a
964	15	30	40	200	2	a
965	10	a	5	5	5	5
011190	40	30	30	150	1	a
011191	20	20	15	200	a	a
011192	10	10	30	300	2	5-
011193	20	10	10	80	5	5-
011194	20	10	15	80	1	5-
011195	30	10	15	50	1	7
011196	40	20	15	80	1	7
011197	20	15	30	80	2	5-
011198	20	20	30	100	1	a

Sample No.	Ni	Co	Cu	V	Mo	Pb
011199	10	10	10	30	a	a
011200	40	20	15	150	a	a
011201	30	15	20	100	a	a
011202	15	10	20	50	1	a
011203	80	5	20	30	7	a
011204	15	10	30	300	10	5-
011205	340	20	70	500	7	5-
011206	15	10	25	100	5	5-
011207	40	10	25	200	7	5-
011208	20	5	30	200	10	5-
011209	20	20	25	100	1	5-
011210	40	20	20	100	2	5-
011211	40	30	30	100	2	5-
011212	30	30	30	100	5	5-
011213	100	20	20	20	1	a
011142	40	20	100	150	2	5-
011143	30	15	70	300	1	5-
011144	30	10	70	700	5	5-
011145	60	40	70	300	5	5-
011146	150	60	70	300	2	5-
011147	100	60	70	300	5	5
011148	80	80	70	300	2	5
011149	20	10	40	150	10	5
011150	30	20	50	150	a	5
011151	15	12	40	50	a	5-
011154	20	10	70	70	a	5
011155	200	10	10	10	a	5-
011156	40	12	15	300	5	5-
011157	12	12	20	150	a	5-
011158	5	12	25	150	a	5-
011159	10	12	70	150	a	5-
011160	30	30	70	150	10	5-
011163	30	15	100	300	a	5-
011164	60	30	100	500	5	5-
011165	60	15	30	200	5	5-
011166	60	20	25	100	2	5-
011167	40	15	15	50	1	5-
011168	80	30	40	150	a	5
011169	60	20	40	100	a	5-
011170	100	60	50	150	a	5
011171	60	40	50	150	a	5-
011172	80	40	50	150	a	5-
011173	80	30	40	200	a	5-
011174	30	30	7	100	a	5-

Sample No.	Ni	Co	Cu	V	Mo	Pb
011175	80	40	50	150	a	5-
011176	80	60	40	200	a	5-
011177	100	40	50	200	a	5
011178	80	30	70	150	15	10
011179	20	12	40	100	5	5
011180	40	40	25	150	2	5
011181	30	10	15	30	2	5-
011182	150	20	50	80	5	5-
011183	300	30	15	100	5	5-
011184	30	10	10	20	a	5-
011185	40	12	25	100	a	5
011186	40	5	40	500	30	5
011187	30	12	25	100	a	5-
011189	80	60	50	200	a	5-
011188	40	15	50	80	2	5-
011162	80	30	50	500	10	5-
011153	15	15	20	100	5	5-
011118	60	20	25	80	1	5-
011119	80	20	40	150	2	5
011120	80	30	40	300	a	10
011121	40	15	50	300	2	10
011122	80	40	70	300	2	10
011123	60	40	150	200	7	10
011124	60	30	50	150	3	5-
011125	60	40	25	300	2	5
011126	15	20	150	500	3	5-
011127	40	30	100	300	5	5-
011128	80	40	80	300	5	5-
011129	80	30	80	300	2	5
011130	80	30	80	200	5	5
011131	40	20	80	150	a	5
011132	30	15	40	100	2	10
011133	80	40	40	100	a	5-
011134	80	40	50	150	a	5
011135	60	40	150	300	a	10
011136	80	15	200	200	5	5-
011137	40	40	80	200	3	5-
011138	60	30	100	200	2	5-
011139	40	15	80	300	5	5
011140	80	40	80	300	a	20
011141	60	30	100	300	5	20

Sample No.	Ni	Co	Cu	V	Mo	Pb
011152	30	10	70	100	a	70
011161	70	5-	100	500	15	150

a = sought but not detected

5-= less than 5 p.p.m.

Ag, Sn and Be were sought but not detected in any sample. Detection limits Sn5 p.p.m., Be 2 p.p.m., Ag 1 p.p.m.

Lab. Serial No.
Plate Nos. 795 to 800 inclusive.

Report No. 2 July, 1964.

Analysis of Gossans and Stream Sediment from the Davenport Ranges, N.T.

by

S. Baker

Following are results for the analysis of gossans, and sediments submitted by W.S. Yeaman on July 7, 1964. Sample localities are as follows.

Field No.	Air Photo	Locality
0060216	Bonney Well, Run 10, Photo 5050	¾ ml. W of Great Davenport
0060217	As above	200 yds. W of 0060216
0060218	As above	1½ ml. W of Great Davenport
0060219	As above	Great Davenport Prospect
0060231		17 ml. E of Kinundi

0060220 - 0060230 no localities given

All results are expressed in parts per million.

Gossans	Ni	Co	Cu	Zn	Au	V	Mo	Pb	Be
0060216	30	25	30	65	a	5-	80	a	a
0060217 (A)	60	42	30	72	90	5-	80	a	5-
0060217 (B)	85	47	29	79	a	150	15	a	15
0060217 (C)	50	17	30	49	a	5-	50	a	a
0060217 (D)	50	17	35	45	a	500	a	5	a
0060218 (A)	190	94	250	500	a	500	7	a	10
0060218 (B)	200	25	79	480	a	500	5	5	5-
0060218 (C)	300	45	100	350	a	700	20	a	5-
0060219 (A)	220	40	530	300	a	300	20	a	10
0060219 (B)	250	40	480	310	a	300	20	a	a
0060219 (C)	300	60	100	510	a	150	10	a	20
0060231	100	50	29	160	a	300	a	100	a

NOTE :

For all samples chromium was less than 50 p.p.m.

Only sample 0060217A was found to carry just detectable amounts of silver. It is associated with the gold in alloy form.

Sample 0060231 contains a carbonate.

a = sought but not detected. Detection limits 10-20 p.p.m. Au 5 p.p.m. Pb, 2 p.p.m. Be and 2 p.p.m. Mo.

5- = less than 5 p.p.m.

Sediments (All results in p.p.m.)

	Cu	Zn		Cu	Zn
0060220 (Bank)	6	25	0060224 (Bed)	10	25
0060220 (Bed)	6	25	0060225 (Bed)	8	25
0060221 (Bed 1)	6	25	0060226 (Bed)	10	30
0060221 (Bed 2)	6	25	0060227 (Bed)	10	25
0060222 (Bed)	6	25	0060228 (Bed)	7	25
0060222 (R. Bank)	10	25	0060229 (Bed)	10	25
0060223 (Bed)	10	25	0060230 (Bed)	10	25

Note : For all samples : Ni less than 12 p.p.m.
Co less than 12 p.p.m.
Pb less than 25 p.p.m.

Serial No. 1553
Plate No. 803

Report No. 3

28th July, 1964.

Spectrochemical and Chemical Examination of a Chip Sample from Emerald Hill Field

by

A.D. Haldane

The following results were obtained by spectrochemical analysis of a chip sample, No. LSF145829 from an open cut, tin-lead working at the south end of Emerald Hill Field, submitted by P. Crohn, State - Northern Territory 1:250,000 - D53/9, Katherine 1:50,000 - Mount Todd. 30 miles S.E. of Pine Creek.

	Spectrochemical	Chemical
Nickel	15 ppm	
Cobalt	60 "	
Zinc	2000 "	2300 ppm
Copper	1500 "	1200 "
Vanadium	150 "	
Molybdenum	20 "	
Tin	5000+ "	
Lead	5000+ "	29.8%
Beryllium	10 "	
Arsenic	1000+ "	2500 ppm
Silver	present	160 "

In addition to the normal silicate gangue elements indium and bismuth were also detected in trace amounts (100 ppm or less). Gold was not detected. The sample was completely oxidised and no sulphides were present.

Lab. Serial No. 1517

Plate No. 801

Report No.4.

August 6th.1964.
File 120/NT/20.

Examination of three clay siltstone samples from Rodinga and Henbury 1:250,000 Sheets, Northern Territory.

by

I.R. Pontifex

The samples were submitted by A.J. Stewart.

Field No. R4.

Locality: Rodinga 1:250,000 Sheet, "near the Finke River."

Description: This specimen is a white semi-indurated clay like substance encrusted by a salty material along exposed surfaces.

Field No. HY.718

Locality: Henbury 1:250,000 Sheet, air photo run, HY 13/5142 the specific locality is not clearly given, apparently the specimen is from the Winnall Beds.

Description: The rock is a markedly pure white semi indurated clay-like substance. Salty encrustations occur on weathered surfaces.

Field No. HY 190.

Locality: Henbury 1:250,000 Sheet. No further details are given.

Description: This specimen is a pink semi-indurated siltstone containing irregular white, grey and dark pink lamellae which appear to be bedding. Some of the bands contain minor halite and exposed surfaces in the rock are encrusted by a salty material.

Report No.4(Cont.)

The specimens were subjected to various chemical and physical analyses. The weight percent of water and acid soluble salts was determined in each and these salts were identified microscopically. The insoluble residue was analysed by X-ray diffraction. The rocks were analysed chemically for the Cl, CO_3, and SO_4 radicals and also for phosphate.

The results are tabulated as follows:

	R4	HY718	HY190
Chloride radical	Present	Present	Present
Carbonate radical	Absent	Absent	Absent
Sulphate radical	Absent	HCl sol. Present	Absent
Wt% H_2O soluble salts	0.16	0.10	0.14
Composition H_2O sol. salts	Halite	Halite	Halite
Wt.% HCl soluble salts	Negligible	0.02	Negligible
Composition HCl sol.salts.	-	Gypsum	-
Composition insol.residue	Mixture kaolin and halloysite	Mixture kaolin and halloysite.	Mixture kaolin, Fe rich quartz silt, access. heavy mins.
Phosphate	Absent	Absent	Absent

On a mineralogical basis these rocks appear to be of sedimentary origin. Some of the halite occurs as an inherent component of the clay matrix which indicates that the material accumulated in an environment suitable for the formation of evaporites. Some of the halite, however, has formed after the consolidation of these rocks, this may have derived from within the rock by processes of leaching or from an unrelated external origin.

Report No. 6

File No. 198/P.N.G. 7
August 19, 1964

MINERAGRAPHIC DESCRIPTION OF A SPECIMEN FROM DRILL CORE, ASTROLABE COPPER FIELD, NEW GUINEA

by

I. R. Pontifex

Sample submitted by A. Mather.

Locality: Pt. Moresby Sheet, Astrolabe Copper Field, Laloki, N.G.

Ore minerals present: sphalerite, chalcopyrite, pyrite.

Description: The minerals have an overall granular texture although a vague banding is produced by poorly defined bands of chalcopyrite and spalerite.

Pyrite (40% of the ore minerals) is scattered through the section as discrete brecciated subhedral grains up to 0.1 mms. across and in granular aggregates up to 0.5 mms. across. Many subhedral pyrite crystals grade into concentrically banded micro-crystalline pyrite and some discrete grains of this variety are also present. The pyrite is commonly associated with epigenetic quartz; some occurs as inclusions in sphalerite both as free grains and associated with quartz.

Sphalerite (45%) occurs as irregular brecciated masses which have an average size of 0.5 mms. across. Commonly the sphalerite contain allotriomorphic inclusions of chalcopyrite. The average size of these inclusions is about 0.05 mms., they have an apparent random distribution in the sphalerite host. This relationship indicates that chalcopyrite and sphalerite are genetically related.

Chalcopyrite also occurs as discrete grains, most of which are concentrated in a poorly defined band about 0.5 mms. wide. In this band chalcopyrite is intimately associated with minor sphalerite.

Epigenetic quartz carrying pyrite commonly fills fractures within brecciated sphalerite and chalcopyrite. These relationships suggest that the quartz and pyrite were introduced from an external source after the formation of the sphalerite and chalcopyrite, or alternatively, they are genetically related to these sulphides and remobilised in situ after their brecciation.

No magnetite is present in the section.

Report No. 7

File No. 198 P.N.G./1
August 19, 1964.

MINERALOGICAL EXAMINATION OF 2 SPECIMENS FROM WASILAU AREA, TALASEA DISTRICT, N.G.

by

I. R. Pontifex

Samples submitted by G.A. Taylor

Field No. W1, Submitted to Taylor by F. Subelei

This specimen consists of crushed granular pyrite and quartz. These minerals are stained with secondary iron hydroxides. A study of three polished sections of random samples from this specimen revealed that the only opaque mineral present is pyrite and this occurs as discrete fractured grains and as inclusions in white "buck" quartz.

No inclusions or admixtures of other minerals in the pyrite were evident at X1000 magnification.

Field No. W2, submitted to Taylor by Isa Tombeo of Watom.

This specimen consists of brecciated, granular pyrite carried by white vein quartz, both minerals are stained by oxidation products of pyrite. The vein material intrudes an altered medium grained, chlorite rich crystalline country rock.

Pyrite is the only opaque mineral detected in polished section.

In thin section the pyrite was found associated with a gangue consisting dominantly of quartz together with minor calcite and coarse grained sericite. This material intrudes a medium grained altered rock made up of a heterogeneous mixture of quartz, plagioclase (oligoclase), fine grained sericite and chlorite. The sericite appears mainly to be an alteration product of plagioclase. Accessory flakes of biotite associated with chlorite suggest that the chlorite is derived by alteration, from biotite.

The positive identification of this country rock type is difficult because it is highly altered, however on the basis of this examination it is classified as a fine-grained granodiorite.

The association of calcite with pyrite suggests that the vein material may not be genetically related to the acid igneous country rock but rather that it was introduced from an external, relatively more basic source.

Report No.8

File No.198NT/1
25th August, 1964.

MINERALOGICAL EXAMINATION OF BEACH SAND FROM VICTORIA RIVER DISTRICT, PT. KEATS 1:250,000 SHEET.

by

I.R. Pontifex

Sample submitted by P. Crohn.
Field No. 145834.
Location Victoria River District, 1:50,000 Sheet: Turtle Point.

Mineralogical Composition

Property isolating specific fractions.	Wt.%	Volume %	Approx.proportion of mineral components in each fraction
1. Attracted to hand magnet	40	36.8	95% magnetite, 5% magnetite-ilmenite composites
2. Magnetic at 0.2 amps on Frantz separator	41	35.2	85% ilmenite, 15% ilmenite-iron oxide admixtures.
3. Magnetic at 1.2 amps on Frantz separator	8	9.1	50% ilmenite-iron oxide admixtures, 10% rutile, 20% garnet, 10% hornblende. accessory iron oxides.
4. Completely non-magnetic heavies	1	1.6	35% zircon, 30% monazite, 10% tourmaline, 20% opaques
5. S.G. less than bromoform	10	17	mainly quartz

Methods of analysis and comments

1. The fraction with an S.G. less than bromoform was separated by heavy liquid separation techniques.

2. The heavy fraction was combed by a hand magnet to remove the magnetite.

3. The remaining heavy sand was split into fractions on the Frantz separator.

4. Each fraction was weighed and the volume of each was determined by replacing the volume of sand in each container with an equal volume of water. This is not an accurate determination but the values obtained are adequate for this investigation.

5. The non-opaque grains in fractions 3 and 4 (shown in the accompanying table) were identified under the petrological microscope.

6. The grains in fraction 2 were identified as ilmenite by x-ray powder diffraction.

7. Grains from fractions 1, 2 and 3 were examined in polished section. This examination revealed that the component grains in each fraction were made up of the following.

Fraction 1. Magnetite 95%. Each grain is generally altered (to varying degrees) along crystallographic directions by hematite and around its periphery by iron hydroxides. The magnetite is titaniferous and about 5% of the magnetite grains in the section contain inclusions of ilmenite. The inclusions occur as blebs along crystallographic planes of the magnetite host or as allotriomorphic intergrowths with the magnetite.

Fraction 2. Ilmenite 85%. The varying optical properties of the ilmenite grains suggests that they contain homogeneous mixtures of iron oxides of varying amounts. The ilmenite grains are commonly enclosed by an alteration corona of leucoxene. The remaining 15% is a mixture of Ti and Fe minerals. Some ilmenite grains contain exsolved blebs of hematite, some are intergrown with magnetite. Minor amounts of hematite contain ilmenite blebs. This is the variety ti-hematite and indicates an admixture of Fe_2O_3 with greater than 10% TiO_2. Accessory amounts of magnetite, almost completely replaced by hematite are also present.

Fraction 3. The opaque minerals in this fraction consist mainly of ilmenite which contains various admixtures of iron oxides. Rutile and hematised magnetite are present in minor abundance.

REPORT NO. 9

ANALYSIS FOR TRACE METAL OF MAGNETIC MATERIAL FROM ASTROLABE, N.G.

by

S. Baker

Following are results for the analysis of trace metals in magnetic material from Astrolabe, T.P.N.G. Table I refers to the analysis of the samples as received from the field and Table II refers to these samples, after crushing and further purification by magnetic separation under water: The samples were collected as part of the geochemical sampling programme of the Astrolabe Mineral Field and extensions.

TABLE I

Field No.	Cu	Ni	Co	Zn	Pb
070203	70	80	80	440	Not detected.
6	90	130	110	420	"
12	76	120	100	490	"
14	120	160	110	460	"
17	120	170	120	460	"
19	56	120	90	550	"
24	62	90	60	480	"
26	67	120	80	460	"
28	100	90	80	410	"
30	90	110	100	450	"
32	49	40	40	380	"
34	50	50	50	400	"

TABLE II

Field No.	Cu	Ni	Co	Zn	Pb
070203	50	100	100	610	Not detected.
6	70	140	120	550	"
12	50	125	110	510	"
14	90	150	120	550	"
17	80	160	130	550	"
19	45	100	80	690	"
24	50	80	60	500	"
26	65	105	80	520	"
28	90	105	80	570	"
30	90	125	110	610	"
32	45	40	60	590	"
34	45	40	50	600	

Lab. Serial No. 1540.

REPORT No.10. 1/9/64

PHOSPHATE ANALYSIS OF SAMPLES FROM THE GLENORMISTON AND CAMOOWEAL AREAS OF THE NORTHERN TERRITORY.

by

S.C. Goadby

1. Four samples from Oodatra Point, Nora Formation, submitted by J.N. Casey.

Sample No.	% P_2O_5
1	0.3
2	0.5
3	0.3
4	0.8

II. Three samples from two miles W. G273 Toko Range, submitted by J.N. Casey.

1	10.6
2	4.4
3.	12.7

III. Sample No.150: Camooweal Four Mile : four miles north of Thorntonia Station.

$\%P_2O_5 = 2.6$

Report No. 11 File No. 198NT/1

September 1, 1964.

Mineralogical investigation of a mineralised amygdaloidal basalt from Bonney Well 1:250,000 sheet, Davenport Ranges, N.T.

by

I.R. Pontifex

Sample submitted by	:	Dr. N.H. Fisher
Locality	:	Bonney Well 1:250,000 sheet. Air photo (1950 series) run 8, No. 5136, 1" N.W. of centre.
Rock classification	:	Amygdaloidal meta-andesite
Ore Minerals present	:	Chalcopyrite, bornite, chalcocite, covellite, chrysocolla, hematite, iron-hydroxide.
Copper assay value	:	0.27% Cu
Spectrographic analysis	:	Values in p.p.m. Ni, Co, Zn, Cu, Mo, Pb 50 50 a 2000 a 150

Description of Hand Specimen. This rock has a crystalline, fine grained grey matrix which contains pink felspar phenocrysts and amygdaloidal epidote, calcite, and copper minerals. Through the rock vapour vesicles have an erratic distribution; these measure up to 8 mms across.

The felspar euhedra are pink and measure up to 4mm. in maximum dimension. Epidote occurs as dark green needle-like crystalline aggregates which partially or completely fill vesicles, also as irregular light green patches scattered at random through the ground-mass. Calcite is coarsely crystalline and localised in vesicles.

Nodules of copper minerals up to 4mm. across are present in minor abundance; these are commonly surrounded by hematite and epidote and the entire assemblage is localised in gas vesicles.

Some of the porphyritic, epidote rich rock incorporates large angular fragments of cryptocrystalline silica. The weathered surface of the rock is pink-brown due to iron staining.

Description of Thin Section. Three sections were examined. The ground-mass in most of the rock consists of a fine-grained mass of interlocking felspar laths and actinolite prisms. Iron-stained sericite and minor chlorite fill interstices in the ground-mass and minor grains of epidote and irregular patches of chlorite are distributed through it.

.../2.

The distribution and abundance of large felspar euhedra give the rock a porphyritic texture. These are plagioclase which have an albite-oligoclase composition; they are essentially unaltered, but fine prisms of actinolite grow into their crystal faces and in cracks within them.

A series of deuteric minerals have crystallised in the vesicles of this specimen. The most abundant of these is epidote which occurs in unaltered prismatic crystal aggregates in some vesicles and as more or less allotriomorphic aggregates which line the inner wall of others. Calcite is the next most abundant deuteric mineral. Coarsely crystalline calcite completely fills some vesicles generally however, it is associated with amygdaloidal epidote. Calcite veins transect the epidote and occur along inter-granular boundaries of this mineral. Chlorite is infrequently the major constituent filling some cavities; in these epidote is absent. Chlorite veins cut calcite and quartz. Minor fine allotriomorphic quartz (?glass) partly lines some cavities in the porphyritic sections of the specimen. A rim of disseminated iron oxides commonly surrounds the epidote zone.

In the part of this specimen which contains angular siliceous fragments the ground mass consists of felspar and epidote laths, impregnated with iron hydroxides. Disseminated hematite forms 5%. The vesicles in this section are markedly spherical. They are filled with coarsely crystalline dark green epidote and filled to varying degrees with quartz. Some cavities are lined by a layer about 0.025 mm. thick of fine allotriomorphic quartz, others are occupied by coarse, unstressed quartz euhedra. Rarely the entire vesicle is filled with finely crystalline quartz which is possibly devitrified volcanic glass. Abundant veins up to 0.25 mm. wide consisting of coarsely crystalline stressed quartz cut the groundmass and vosicular fill material; some of these carry epidote.

This rock is essentially an andesite and it is believed to be a differentiate of a basic magma. The occurrence of unaltered albite-oligoclase phenocrysts and actinolite in a basalt containing epidote and calcite is somewhat anomalous and indicates that the original basalt has been reconstituted. It is suggested that the primary constituents of the parent magma were reconstituted during the final stages of crystallisation by the processes of autometasomatism. During this time calcic plagioclase and pyroxenes, usually present in basic magmas, were possibly altered to produce soda-rich plagioclase with the liberation of residual fluids which later formed epidote and calcite.

X-ray analyses. A silicate analysis of the porphyritic vesicular rock type on the automatic X-ray spectrograph by W.B. Roberts revealed the following figures.

SiO_2	54.5%
Al_2O_3	9.9%
Fe	6.4%
MgO	4.22%
CaO	10.06%
Na_2O	4.25%
K_2O	0.45%
TiO_2	1.19%
P_2O_5	0.06%
MnO	0.31%

.../3.

An assay for copper was done by S. Goadby by the addition method on the automatic X-ray spectrograph. The result was 0.27% Cu.

Description of polished section. Six polished sections were cut. The copper minerals occur in discrete nodules which measure up to 3 mm. in maximum dimension. These are localised in vesicules within the rock, inevitably associated with epidote and minor calcite. Individual grains contain up to four copper sulphide minerals with associated chrysocolla and iron oxides. The order of decreasing abundance of these minerals in the specimen is hematite, chalcocite, chalcopyrite, bornite, chrysocolla and covellite.

Mineralisation within each vesicle generally occurs in concentrically arranged colloform type bands. The most complete sequence of concentrically banded minerals seen in section consists of the following zones, listed in order from inner to outer-most.

1. Chalcopyrite, an amygdaloidal core up to 0.30 mms. across.
2. Bornite, a zone about 0.15 mms. wide.
3. Chalcocite, an irregularly shaped zone up to 1mm. wide.
4. Covellite, patches and blades around the outer margins of chalcocite.
5. Chrysocolla, an incomplete rim about 0.1 mm. wide.
6. Hematite, a continuous zone of irregular width, average about 0.3 mm. wide.
7. Epidote, the outermost zone about 0.4 mm. wide, lining the walls of the vesicle.

(The identification of hematite and epidote was confirmed by X-ray diffraction).

The relative abundance of the minerals and the extent of banding varies considerably. However their spatial relationship is consistent. In some cavities chalcopyrite is absent, in others it (and bornite) forms almost the entire core within epidote. In these, chalcopyrite (and bornite) is generally surrounded by a narrow corona of chalcocite. In several grains the core within hematite and epidote consists of bornite, chalcocite and covellite intimately intergrown along crystallographic planes of chalcopyrite.

The hematite band is almost inevitably present and commonly is the sole mineral within epidote. It is generally made up of matted acicular blade-like crystals (probably specularite) and these project into adjacent chrysocolla, chalcocite, or covellite and less frequently into radial fractures in the surrounding epidote. Iron hydroxides impregnate and lace the hematite zone.

In the part of the specimen containing siliceous fragments skeletal hematite grains are disseminated through the groundmass. No sulphides were observed in the groundmass or carried by veins in any section.

Conclusions. On the basis of petrological study and a silicate analysis this rock is considered to be a porphyritic and amygdaloidal oligoclase meta-andesite whose alteration is probably deuteric. The main minerals are plagioclase, actinolite, epidote, and calcite with minor chlorite and quartz. Immediately after the consolidation of the rock a number of deuteric minerals derived from the basalt, were localised in vesicles by late magmatic processes. These were epidote, calcite, hematite, chrysocolla, covellite, chalcocite, bornite and chalcopyrite.

.../4.

It is evident that epidote and calcite were the first formed and these are the most abundant deuteric minerals. Following their crystallisation, further cooling of the last residual magmatic fluids resulted in the seccessive deposition, toward the centre of the mineralised cavities, of bands of hematite, chrysocolla, covellite, chalcocite, bornite and chalcopyrite, in that order. Textural relationships between the copper sulphides indicate that they commonly formed simultaneously.

In the differentiated silica-rich parts of the rock, silica in the form of volcanic glass accumulated in cavities and at even a later stage formed veins. These zones are devoid of copper minerals.

It is difficult to estimate the significance of the copper assay since the relationship between the small amount assayed and its field occurrence is not adequately known. (As a comparison it is pointed out that the extensive amygdaloidal copper ores in basalts from the Lake Superior District, Nth. America, assay between 0.2 and 2.1% Cu., with an average of 0.88% Cu).

Implications

1. Basalts commonly contain 0.02 to 0.04%, (and up to 0.2%) inherent copper mainly in the form of chalcopyrite, bornite and chalcocite. The concentration mechanism interpreted to produce the mineralisation in the specimen would probably have removed the bulk of the copper from the parent rock, therefore large deep-seated copper ores, derived from the same source, are unlikely.

2. The concentration of copper is probably greatest in the upper zones of the basalt body because these zones contain the greatest number of vapour cavities.

3. Just as copper was deposited in the open spaces of gas vesicles, the copper rich, late magmatic solutions could also have been localised in fractures and fissures both along the margins of the basalt in the country rock and within the basalt body itself.

4. All these considerations will influence exploration in this area. It is apparent however that the economic potential of this type of mineralisation will depend mostly on the areal extent of the upper margins of the basalt source rock.

REPORT NO. 12

4th September, 1964

198PNG/7

ARSENIC DETERMINATIONS - NEW GUINEA ORIENTATION SAMPLES

by

N.W. Le Roux

These are the results of arsenic determinations on fourteen orientation samples from New Guinea, submitted by A. Mather.

Sample No.	Arsenic p.p.m.
010001	85
010002	less than 3
010007	less than 3
010011	less than 3
010014	80
010019	245
010022	13
010054	greater than 1900
010059	less than 3
010066	120
010069	20
010073	less than 3
010075	1900
010095	less than 3

SERIAL NO. 1467
1468
1482

REPORT NO. 13

X-RAY SPECTROCHEMICAL ANALYSIS OF ROCKS FROM THE NEW HEBRIDES

by

W. M. B. Roberts

Eight rocks were submitted by the Senior Geologist, New Hebrides Geological Survey, for silicate analysis.

Two numbered LW_{3D} and LW_{15} were from Lopevi, three marked EpW_{17}, EpW_{26}, and EpW_{52} were from Epi, and three, numbered Mm287, Mm286, and Mm294 were from Malekula.

The analyses were carried out by X-Ray spectrography, therefore no FeO/Fe_2O_3 ratio can be given and iron is given as elemental Fe. The analyses are done under vacuum and it is considered that localised heating of the surface by the X-Ray beam under these conditions would remove any loosely bound water, so no H_2O - figures are necessary. Because of the lack of FeO/Fe_2O_3 ratio, a loss in ignition figure would be meaningless because of oxidation of FeO to Fe_2O_3, so no figure for this quantity is given. The results for the analyses, and the totals minus these figures are given in the following table.

	LW_{3D}	LW_{15}	EpW_{17}	EpW_{26}	EpW_{52}	Mm287	Mm286	Mm294
SiO_2	62.1	53.1	58.7	59.9	50.0	51.7	58.15	50.75
Al_2O_3	17.24	20.61	14.84	14.87	17.73	13.31	17.17	19.31
Fe	5.02	5.08	5.72	6.05	7.7	9.2	4.75	6.68
MgO	0.4	4.21	0.75	0.3	7.5	8.365	2.68	5.2
CaO	6.07	10.73	4.95	4.58	11.3	8.04	6.09	9.96
Na_2O	4.3	2.87	2.32	4.16	2.63	3.59	4.92	3.04
K_2O	1.81	0.65	3.15	2.17	0.6	0.1	1.21	0.3
TiO_2	0.7	0.754	0.82	0.79	0.604	1.01	0.54	0.978
P_2O_5	0.21	0.135	0.42	0.31	0.2	0.01	0.18	0.07
MnO	0.14	0.046	0.19	0.5	0.2	0.24	0.22	0.24
	97.99	98.185	91.85	93.62	98.46	95.745	95.91	96.528

File No. 198NT/1

Report No. 14. September 9th, 1964.

Mineralogical investigation of three rocks from the Davenport Range Area, Northern Territory

by

I.R. Pontifex

Samples submitted by Wm.S. Yeaman.

Spectrographic analyses done by A.D. Haldane on the optical emission spectrograph.

Field No. 0060232

Locality: One mile west of Great Davenport Gold Mine.

Registered No. AAD788: Slide No. 14300.

Spectrographic analysis, values in ppm. (a=absent)

Ni	Co	Zn	Cu	Mo	Pb	Ag	Au
150	50	a	100	a	200	a	a

Conclusions:

This rock is essentially a uralitised, saussuratised gabbro. It contains accessory hematite, pyrite, and minor-accessory grains of a possible nickel or cobalt sulphide.

The alteration of the rock may have been induced by autometasomatism during the last stages of magnetic crystallisation or by a subsequent phase of low grade regional or contact metamorphism.

The values of Ni, Co and Cu are within the average range of values for these elements in this rock type, therefore they are not necessarily indicative of inherent, economic concentrations. The Pb content is about 20X the average Pb content in this rock type.

Macro description:

A grey green medium grained crystalline rock with a brown iron stained weathered surface. Several fine pyrite grains are evident.

Petrographic description:

An igneous rock; it has a predominantly hypidiomorphic texture with an average grain size of about 1.5 mm. The main components are pyroxene and felspar, both are extensively altered.

The original pyroxene euhedra are replaced to varying degrees by irregular alteration corona of uralic hornblende. This mineral is generally fibrous and some grades imperceptibly into cavities filled with chlorite and minor actinolite. The composite grains of pyroxene and amphibole make up about 50% of the rock.

The felspar laths measure up to 2 mm. long and 0.5 mm. wide, all are densely clouded with alteration products, mainly sericite with minor, scattered epidote. Indefinite twinning in some relic grains suggests that the felspars were originally a basic plagioclase, however the R.I. of others indicates that they are albitic.

Interstitial fill material through the rock consists of sericite, chlorite, calcite and minor actinolite. Skeletal opaque grains make up about 2% of the section.

Mineragraphic description:

The majority of the opaque grains consist of hematite, these measure up to 1 mm. Accessory amounts of a white mineral with a slightly yellow and rarely, pink tint and slightly anisotropic occur in skeletal grains up to 0.02 mm. in maximum dimension. Some have an indefinite twinning. The extremely limited abundance of this mineral made a positive identification impossible. On the basis of its optical properties and mode of occurrence it is suggested that it may be a nickel or cobalt mineral.

Field No. 0060233

Locality: One mile west of Great Davenport Gold Mine. This is an acid differentiate of 0060232 (Yeaman).

Registered No.: AAO 789. Slide No. 14301.

Spectrographic analysis, values in ppm.

Ni	Co	Zn	Cu	Mo	Pb	Ag	Au
10	10	a	7	5	30	a	a

Conclusions:

This rock has the mineralogical composition of a fine-grained granite, the insipient graphic intergrowth of quartz and felspar, however, suggests that it is more specifically a granophyre or felsite, possibly extrusive. On a mineralogical basis the most likely source of this rock is an acid igneous magma.

The values of elements detected by the spectrograph are within the average range of values of these elements for this rock type.

Macro description:

A pink-light brown fine-grained crystalline rock containing pink felspar, quartz and minor chlorite. It has a light brown white spotted weathered surface.

Petrographic description:

This section has a predominantly granophytic texture with an average grain size of about 0.3 mms. The main minerals are quartz and altered felspar with minor chlorite and epidote.

Quartz makes up about 45% of the rock and occurs in allotriomorphic granular aggregates through the section.

The felspar constitutes about 45%, it generally has a light brown clouding, probably due to its alteration product, sericite, being iron-stained. No multiple twinning is evident in the felspars, however, indefinite microcline textures and carlsbad twins are shown by many relic grains indicating that the majority are potash rich.

Many euhedral felspar grains (or the alteration products derived from them) are intimately intergrown with small rod like and bleb like grains of quartz. Frequently these are concentrated in centric groupings, some pass into somewhat fibrous bleb like aggregates of a felsitic type.

Minor flakes of chlorite (about 5%) and accessory biotite associated with it occur in some interstices. In some parts of the section accessory amounts of a probable epidote mineral are localised along intergranular boundaries of felspar. Opaque minerals make up less than 1% of the section.

Field No. 0060234

Locality: Eight miles N.E. of Murray Downs station. The specimen is derived from an ultrabasic mass adjacent to a Pb, Ag prospect. (Yeaman).

Registered No. AAO 790. Slide No. 14302.

Spectrographic analyses, values in ppm.

Ni	Co	Zn	Cu	Mo	Pb	Ag	Au
7	80	700	100	2	1000	a	a

Conclusions:

This rock is essentially a uralitised dolerite. The main constituents are altered plagioclase, amphibole, and accessory sericite, chlorite, actinolite, epidote, quartz and ?glass. Minor amounts of magnetite, hematite and ilmenite are also present.

The alteration of the rock may have been induced by autometasomatism during the final stages of crystallisation of the primary magma or possibly by a subsequent phase of low grade metamorphism.

The values of lead and zinc are anomalous for this rock type, these may be due to inherent or alternatively, epigenetic enrichment. It is probable that the material causing this enrichment is genetically related to the lead and silver in the adjacent prospect. No lead, zinc or silver minerals were detected under 1000 X magnification of a polished section of this specimen.

Macro description:

A hard, finely crystalline, grey rock containing felspar euhedra and amphibole laths.

Petrographic description:

This rock has an ophitic texture with an average grain size of about 1 mm. The main constituents are extensively altered felspar, amphibole, and accessory sericite, chlorite, actinolite, epidote, quartz, and ?glass.

The feldspar makes up about 50% of the rock, it occurs as laths up to 1.5 mm. long and 0.5 mm. wide, euhedral grains average about 1 mm. across. The grains are densely clouded with alteration products, most commonly sericite with minor chlorite, actinolite and epidote.

The degree of alteration prevented a conclusive identification of the felspar. Many grains showed indistinct albite twinning and less frequently, multiple twinning. The association of an epidote mineral with the felspars suggests that they were originally a calcic variety.

Abundant reddish brown patches through the section have an anomalous spherulitic texture and contain concentrations of fine opaque grains. These may be hematite stained saussuratised felspars. Alternatively W. Oldershaw suggests they may be a variety of magmatic glass.

The amphibole is mostly hornblende, it makes up about 40% of the section and occurs in irregular patches and grains up to 1 mm. The grain boundaries are poorly defined. Some grains occur as twinned laths, others are somewhat fibrous. The textures and mode of occurrence of this mineral suggests that it is uralic hornblende derived from pre existing pyroxene. Fine grained quartz occurs in accessory amounts as interstitial fill material.

Mineragraphic description:

Opaque minerals make up about 7% of the section. These consist predominantly of skeletal and euhedral grains of magnetite which show varying degrees of alteration to hematite. The hematite (variety martite) replaces the magnetite around grain boundaries and along its crystallographic planes. The hematite shows insipient alteration to iron hydroxides.

Rarely some magnetite grains contain minor exsolution blebs of ilmenite.

Report No. 15

File No. 198PNG/1
Sept. 10 1964.

MINERALOGICAL EXAMINATION OF FOUR SPECIMENS FROM WILLAUMEZ PENINSULA, CAPE RAOULT 1:250,000 SHEET. T.P.N.G.

by

I.R. Pontifex.

Samples submitted by C.D. Branch for "the determination of the economic potential" of each specimen.

Locality. All specimens were submitted to Branch by Tolari Murubatim of Rakanda village, they are from the foot of Willaumez Peninsula, along Tolo river, inland from St. Maria Mission.

Field No. T1. Registered no. BAA009

Field name. Sheared mudstone with pyrite.

Mineragraphic study, conclusions. This rock consists of a granular complex of ore minerals, the approximate proportion of each in the polished section examined is

sphalerite	45%
pyrite-marcasite	10%
galena	7%
chalcopyrite	2%.

The minerals are of hydrothermal origin and appear to have localised by filling planar cavities, possibly shear or cleavage planes. They have been brecciated subsequent to their crystallisation.

This specimen is extremely good ore material on a mineralogical basis, its economic potential however, depends entirely on the distribution and abundance, in the field, of the mass which it represents.

Macro description. A heavy, grey, fine grained rock containing coarsely crystalline galena, pyrite, marcasite and fine-grained sphalerite. The coarse crystals have concentrated in planar drusy cavities and localised in bands up to 3mm. wide. Irregular veins of quartz occur intimittantly along the mineral bands.

Micro description. Sphalerite makes up about 45% of the section, it occurs in brecciated massive grains which have an extremely irregular shape. The average grainsize is about 1mm., the maximum is 2.5mm.

Sphalerite invariably contains exsolution inclusions of chalcopyrite, these are bleb and rod shaped and have an average size of about 0.003 mm, the maximum is 0.05 mm. The abundance and distribution of these inclusions in the sphalerite varies, most are randomly disseminated which produces a mottled texture, some are oriented along morphological directions of the host. Commonly chalcopyrite has migrated to, and concentrated around, the periphery of sphalerite. Rarely chalcopyrite forms discrete grains and allotriomorphic intergrowths with sphalerite.

Idiomorphic grains of pyrite are scattered through the sphalerite matrix, these generally measure about 0.3mm., many of them are brecciated. The majority of iron sulphides in the section (total 10%) occur as brecciated idiomorphic grains up to 2mm restricted to cellular bands in the rock. These grains are predominantly marcasite, some however, appear to have a composition between pyrite and marcasite.

Galena makes up about 7% of the section, this mineral occurs as fine skeletal grains filling voids in sphalerite, and more commonly as coarse hypidiomorphic masses up to 4 mm. in cellular bands, associated with marcasite.

Field No. T2. Registered No. BAA 010

Field name. Hematite

Mineragraphy. This specimen consists entirely of a foliaceous aggregate of hematite. Polished section study reveals that the hematite commonly has a bladed and micaceous form and frequently it is coarsely fibrous. Many rhombohedral crystals are present, this is the crystalline variety of hematite, specularite. Fine lamellae of magnetite occur in some crystals and blades.

On a mineralogical basis this rock should contain about 70% Fe, its economic potential however will depend on the nature and extent of the rock mass it represents.

Field No. T3. Registered No. BAA011

Field name. Pyrite, chalcopyrite, hematite and a silvery mineral in vein quartz.

Mineragraphy, conclusions.

This specimen could be indicative of significant copper mineralisation. The suite of ore minerals in this rock, the presence of the same minerals in T1, T2, and T4, and the presumed fact that all these specimens have the same proximity suggests a possible genetic relationship between the mineralisation in each. From this viewpoint the minerals in this specimen are significant, however it is pointed out that the associations of the same minerals in the other specimens are different. Their geological relationships and hence economic potential can therefore be best assessed from field studies and possibly further detailed mineralogy.

Description. This specimen consists of white quartz which carries coarsely crystalline pyrite and contains drusy cavities in which pyrite, chalcopyrite, hematite and minor marcasite have crystallised. Much of the chalcopyrite is coated by a silvery-blue irridecent, and less commonly, red oxidation bloom. The hematite is the variety specularite.

These minerals are associated with minor chlorite and possibly calc-silicate minerals.

The silvery mineral noted in the field probably refers to the blue iridecent chalcopyrite, possibly to the accessory marcasite.

Field No. T4. Registered No. BAA012

Field name. Pyrite.

Mineragraphy. This specimen consists of massive, fine grained magnetite which contains large, irregular, somewhat cellular pockets of coarsely crystalline pyrite.

On a mineralogical basis it is unlikely that this material is suitable as an ore of either iron or sulphur. The pyrite content makes it unsuitable as an iron ore when compared with the present availability of good iron ore reserves. Its potential however, largely depends on the nature and extent of the rock mass from which it is derived.

28.

File No. 120NT/23 Report No. 16

SPECTROCHEMICAL ANALYSIS OF SAMPLES FROM THE HALE RIVER FIELD PARTY

by

A. D. Haldane

F53/14

Three samples, two from the Areyonga Formation and a volcanic rock from the Bitter Springs Limestone were submitted by A. Wells. No sample locations were given.

Spectrochemical results in parts per million are:

	AS 34	AS 39	Pulya Pulya Dam
Nickel	5-	12	10
Cobalt	12	20	5-
Copper	10	2-	30
Vanadium	5	80	40
Lead	15	a	40
Phosphorus	P	a	P

Zn Sn Mo Be were sought but not detected

a sought but not detected

2- less than 2 p.p.m.

P present in percentage amounts

Both phosphatic samples are high in calcium and presumably contain apatite.

Lab. Serial No. 1714.

File No. 120NT/22 Report No. 17

SPECTROCHEMICAL ANALYSIS OF STAIRWAY SANDSTONE

by

A. D. Haldane

Six outcrop samples from the Stairway Sandstone were submitted by P. J. Cook for spectrochemical analysis. Localities are as follows:-

Field No.	Air Photo	Run	General Location
RD119	5089	10	Mt. Charlotte
RD120	5090	11	½ mile N. of Charlotte Well
RD139	5048	14	W. end of Mt. Charlotte Ranges
RD153	5090	11	Mt. Charlotte
RD158	5088	11	7 miles N.W. of Mt. Charlotte
RD167	5091	11	1 mile N.E. Maryvale H.S.

No photo points or grid coordinates are given.

Spectrochemical results in parts per million are given below:-

Field No.	Ni	Co	Zn	Cu	V	Mo	Sn	Pb	Bc	P
RD119	80	50	a	12	100	a	a	80	a	P
RD120	5	10	a	5	20	2	a	10	a	a
RD139	50	10	a	50	40	2	a	150	2	a
RD153	12	12	a	150	5	a	a	20	70	P
RD158	5-	a	a	2-	5	a	a	5	2	a
RD167	10	12	a	15	30	2	a	50	2	a

5- less than 5 p.p.m.
a sought but not detected
P present in percentage amounts

Both phosphatic samples RD119 and RD153 are high in calcium and presumably contain apatite.

Lab. Serial No. 1665, 1668.

REPORT NO. 18

ANALYSIS FOR TRACE METALS OF MAGNETIC MATERIAL FROM ASTROLABE, T.P.N.G.

by

S. Baker

Following are results for the analysis of trace metals in magnetic material from Astrolabe, T.P.N.G. For comparison results for the analysis of "magnetite" taken from a mineralized zone at Paddy's River, A.C.T. are included. The samples are described as magnetic material and not magnetite as they contain more or less ilmenite and silicate gangue.

Sample No.	Co	Ni	Cu	Zn	
070237	30	60	40	430	
070239	40	90	60	500	
070241	30	90	60	430	
070243	30	100	35	420	
070302	40	150	60	510	
070304	35	60	35	500	
070306	40	90	50	710	
070314	40	110	50	1000	
070321	45	150	80	800	
070323	35	110	60	810	
070325	40	140	90	950	
070328	30	140	80	900	
070331	60	270	65	700	
070333	90	200	45	600	
070335	100	240	40	550	
070337	105	210	85	600	
070339	75	150	60	500	
070341	75	230	50	450	
070343	80	430	70	550	
070345	90	330	65	900	
070347	90	190	90	850	
070349	75	350	70	750	
070412	110	450	120	600	
070414	60	300	60	850	
070422	120	90	70	400	
070425	80	80	50	400	
070428	80	90	50	450	
070429	80	100	60	430	
070433	70	110	40	430	
070435	90	120	70	450	
070437	80	580	50	430	
070452	80	370	160	600	
070454	70	370	50	500	
070456	90	600	80	550	
070458	80	400	60	650	
070460	80	600	70	520	
070463	90	180	80	650	
070466	100	350	70	570	
Paddy's River, A.C.T.	30	170	950	3000	Pb present but not determined.

Lab. Serial No. 1540

Report No. 19 Sept. 14, 1964.

Mineralogical study of 3 Canberra quarry samples.

by

I.R. Pontifex.

Samples submitted by E.K. Carter for petrological study with the aim of establishing a possible relationship between the mineralogical composition of the rocks and silicosis.

Conclusions. During certain rock quarrying and crushing operations the rocks being worked may give rise to a fine rock dust which may be harmful to health. The mineralogical composition of the rocks in the Black Mountain quarries indicates that a rock dust derived from them would be predominantly rich in quartz and sericite. A rock dust derived from the rock type in the Ainslie quarry would contain mostly felspar and minor chlorite and quartz.

The extent however, to which these minerals would cause air pollution, and the concentrations which would be injurous to health cannot be determined from the composition of the rock. This would depend almost entirely on the amount of fines expelled into the air during quarry operations, especially crushing.

Field No. Comp 1. Regst. No. BAAo12.
Locality. Old Black Mountain Quarry, N.E. side of Black Mountain, Canberra. S.E. wall of quarry.

Mineralogy. This is a pink fine grained sandstone. The following composition was estimated from a thin section study,

quartz grains, average size 0.1 mm,	45%	(± 5%)
quartz grains, interstitial silt,	15%	(± 5%)
clay and sericite,	30%	(± 5%)
iron oxide grains,	3%	

Description. The entire rock consists of a homogeneous aggregate of subrounded quartz grains which have an average size of about 0.1mm. Accessory, completely sericitised grains of this size are probably altered felspars.

These grains are bonded together by a fine grained, primary, interstitial detritus or matrix, This consists mainly of a clay material and authegenic derivitives there from, notably sericite.

Minor, siltsize quartz and accessory iron oxide grains also occur in the interstices of the rock.

Field No. Comp 2. Regst. No. BAA013.
Locality. Old Black Mountain Quarry, N.E. side of Black Mountain. South side of quarry.

Mineralogy. This is an ironstained, white, medium grained sandstone. Its composition is

quartz grains, average size 0.25mm.	[illegible]%	(± 5%)
quartz grains, average size 0.075mm.	30%	(± 5%)
quartz grains, interstitial silt,	10%	(± 5%)
clay and sericite,	30%	(± 5%)
iron oxide grains,	3%	

Description. The entire section consists of a somewhat loose aggregate of subrounded quartz grains which appear to fall into 2 size groups, one with an average grain size of 0.25mm, the other of 0.075mm. About 10% of the coarse grain fraction consists of fragments of chert, quartz-felspar intergrowths, fine grained quartzite and sericitised rock fragments.

These grains are bonded by a primary interstitial matrix of clay, sericite and silt size quartz. Iron oxide grains make up about 3%.

Field No. Comp. 3. Regst. No. BAA014.
Locality. Old quarry, E. side of Mt. Ainslie, ¼ mile N. of rifle butts.

Mineralogy. This rock is essentially a felspar porphyry, it is made up of the following minerals (the proportions are within the accuracy of ± 5%),

plagioclase felspar, phenocrysts average size 0.3mm,	20%
potash felspar, phenocrysts average size 0.3mm,	10%
chlorite, phenocrysts average size 0.3mm,	10%
felspar, undifferentiated, in groundmass, ave. size 0.025mm,	30%
chlorite, in groundmass, ave. size 0.025mm.	10%
quartz, in groundmass, ave. size 0.025mm.	25%

Description. A fine grained crystalline groundmass contains phenocrysts of felspar and chlorite. The average grain size of the groundmass is about 0.025mm., it consists predominantly of micro-crystalline felspar laths and lesser amounts of micro-crystalline quartz and chlorite.

The phenocrysts have a maximum size of 1.5mm. and an average size of 0.3mm. Plagioclase felspar is the most abundant, and this generally has an albitic composition. Potash felspars show insipient zoning and microcline texture, and less commonly minor blebs of quartz inclusions. The felspars are frequently pitted and show minor alteration to sericite and chlorite. Chlorite phenocrysts appear to be leached and some occur in spherulitic clumps.

Accessory pyrite is scattered through the groundmass.

145ACT/1

Report No. 20.

SUSPENDED SOLIDS IN LAKE BURLEY GRIFFIN

by

J.R. Beevers

The following analyses were carried out on samples submitted by Mr. J. North of the Department of Works, on 6/9/64.

Sample No.	Suspended Solids (mgm /litre or p.p.m.)
9 A ½'	54
9 A 3½'	549
9 A 7 '	51
9 B 1 '	115
9 B 4½'	35
9 B 8 '	6
9 C 1'	67
9 C 4½'	65
9 C 8 '	121
12 A 1½'	67
12 A 7½'	58
12 A 13½'	112
12 B 1 '	318
12 B 5½'	72
12 B 10 '	7
12 C 1'	68
12 C 4½'	107
12 C 8 '	83
16aA 3 '	61
16aA 14 '	3
16aA 25 '	88
16aB 3½'	30
16aB 18 '	135
16aB 32½'	88
16aC 3 '	247
16aC 16 '	133
16aC 28 '	227

Lab. Serial No. 1713.

REPORT NO. 21 198 PNG/7

ARSENIC DETERMINATIONS - NEW GUINEA
ORIENTATION SAMPLES

by

N.W. Le Roux

These are the results of arsenic determinations on four orientation samples from New Guinea, submitted by A. Mather.

SAMPLE NO.	ARSENIC p.p.m.
010018	43
010053	345
010058	13
010066	40

SERIAL NO. 1467
1468
1482

File No. 198NT/1
Sept. 16th, 1964.
Report No. 22.

Mineralogical examination of a mineralised basic igneous rock from Davenport Ranges, Northern Territory.

by

I.R. Pontifex

Sample submitted by S. Yeaman.

Field No. 0060235.

Locality: ± 1 miles south of Kurinelli Mine, Frew River
1:250,000 Sheet, Northern Territory.

Field name: Gabbro with chalcopyrite.

Conclusions: This rock is an extensively altered tholeiitic dolerite.

The occurrence of the graphic intergrowth of quartz and feldspar in this rock implies the qualification of tholeiitic and suggests that it may be a localised differentiate of a gabbroic or doleritic parent magma. The alteration may be due to late stage magmatic metasomatism or to low grade metamorphism subsequent to the crystallisation of the rock.

The only metallic minerals of significant abundance are pyrite and magnetite. The pyrite may have a specific genetic association with calcite veins, it is likely however that both these minerals are inherent to the host rock.

The spectrographic analyses do not suggest any economic potential of this rock for Ni, Co, Zn, Cu, Mo, Pb, Au or Ag. The restricted occurrence of fine chalcopyrite grains may prove significant from an ore genesis view point.

Macro description: A medium grained, grey-green crystalline rock containing altered calcareous plagioclase, and chlorite. Discrete crystals of iron stained pyrite are scattered through the rock.

Petrology: The rock has an inequiangular, ophitic texture.

Interlocking laths of plagioclase up to 1.5 mm. form about 40% of the rock. These are saussuratised and extensively replaced by calcite, sericite, and minor chlorite and epidote. Minor, relatively small discrete grains of unaltered labradorite and orthoclase occur in the matrix.

Altered plagioclase is commonly associated with graphic intergrowths of quartz and felspar which occur as interstitial fill material, partly surrounding some plagioclase. These make up about 7% of the section, they may have derived from the crystallisation of the primary magma or alternatively, by processes of metasomatism and reconstitution of the rock, in situ.

Chlorite (30%) is abundant through the matrix and forms irregular clumps. Rarely chlorite surrounds poorly defined cores of a probable pyroxene. Generally however, pyroxene and amphibole minerals are absent.

Calcite (10%) occurs in irregular patches and veins. Idiomorphic pyrite is commonly surrounded by calcite and some fine pyrite euhedral are localised in calcite veins.

Opaque minerals make up about 5% of the section.

Silicate Analysis: The figures obtained by W.M. Roberts are:

SiO_2	44.6%
Al_2O_3	9.1%
Fe	10.74%
MgO	6.38%
CaO	10.2%
Na_2O	1.37%
K_2O	1.25%
TiO_2	1.08%
P_2O_5	0.02%
MnO	0.27%

Water, and the values for the various oxidation states of Fe were not determined.

Spectrographic analysis: The values obtained by A.D. Haldane on the optical emission spectrograph are:

Ni	Co	Zn	Cu	Mo	Pb	Au	Ag
30	50	a	40	a	10	a	a

all values in p.p.m.
a= absent

S. Goadby analysed the rock for Cu by the addition method on the X-ray spectrograph. The result was 0.05% Cu.

Mineragraphy: Four polished sections were examined, two were cut at random, two were cut to intersect sulphide mineralisation observed in hand specimen.

Pyrite forms about 5% of the rock, it occurs as discreet idiomorphic grains up to 4 mm. and as fine discrete grains scattered through the matrix.

Magnetite generally forms skeletal grains, most of which appear to be extensively corroded idiomorphs. These measure up to 1 mm. and form about 3 % of the rock.

Probable chalcopyrite occurs as fine grains disseminated through the matrix and also associated with magnetite. The maximum size of these grains is about 0.003 mm. which is too small for a positive identification.

File No.120PNG/9
September, 21.

Report No. 23.

Mineralogical Study of 3 panned concentrates and a manganese mineral from Cape Vogel, N.E. Coast, Papua.

by

I.R. Pontifex.

Samples submitted by J.E. Thompson.

Field No. Bob 40

Locality 1:50,000 Sheet. Posa-Posa Harbour, Papua. Cape Vogel.

Field Description: Panned concentrate from surface of coarse enstatite rock.

Mineralogy: The concentrate was separated on the isodynamic separator into 4 fractions; these were mounted in plastic and examined microscopically.

Following is the approximate volume percent (± 5%) of the minerals present,

chromite	53.8%
enstatite	15.4%
magnetite	11.5%
rutile	10.3%
corundum	9.0% .

Some chromite exhibits anomalous optical properties suggesting that it contains varying amounts of admixed iron oxides.

The Fe:Cr ratio of the chromite was determined by S. Goadby on the X-Ray spectrograph. The result was;
Fe:Cr ratio, 1:3.1

Field No. Bob 1A.

Field Name: Roughly panned concentrate from weathered clino-enstatite rock.

Location: as for Bob 40.

Mineralogy: This rock consists essentially of,

chromite 60% (± 10%)

enstatite 30% (± 5%)

iron oxides and biotite 10% (± 5%).

There was insufficient blue mineral included in this concentrate for a positive identification.

Field No. Bob 1B

Field Name: Panned concentrate from gutter on surface of weathered clino-enstatite rock.

Location: as for Bob 40.

Mineralogy: Two fractions were separated on the iso-dynamic separator, these were examined microscopically. The approximate volume % of the minerals present is:

enstatite 65%
chromite 30%
Minor iron oxides.

The Fe:Cr ratio of the chromite determined on the X-Ray spectrograph was,

Fe:Cr, 1:2.2.

Field No. LB108

Field Name: Manganese nodule.

Macro description: A black, fine grained, massive manganese mineral with a smooth, reniform weathered surface. The texture within the rock varies from fine-grained somewhat soft to relatively hard botryoidal masses made up of concentric layers which have a steely lustre.

Petrology: Two thin sections were examined. Black, opaque masses and flakes of the manganese mineral was the only material observed.

Mineragraphy: The concentric layers seen in hand specimen consist of cryptocrystalline aggregates of intersecting irregular prisms and patches of pyrolusite. These contain accessory amounts of pyrite grains which have an average size of about 0.003 mm.

The bands grade imperceptibly into an aggregate of acicular pyrolusite. Individual flakes measure about 0.002 mm.;these are intergrown with minor amounts of another manganese mineral of the same grain size. This mineral is possibly psilomelane the, flakes are too fine however,for a positive identification.

No features of this specimen indicate any specific mode of origin.

Report No. 24 2nd October, 1964

MINERALOGICAL EXAMINATION OF ROCKS FROM RED HILL AND MOUNT MUGGA QUARRIES, A.C.T.

by

I. R. Pontifex

The thin sections were submitted by P. Wilson. The main aim of the investigation was to establish the mineralogical composition of each rock. Slides No. 818 to No. 823 from Mt. Mugga quarry have previously been described by W. B. Dallwitz, (B.M.R. Record 1949/50). These are not described again in this report but the proportions of minerals present in the rocks they represent are listed.

Slide No. 142

Location: Red Hill Quarry, A.C.T.

Petrology: This is essentially a fragmental rock, the components of which have a tuffaceous, and to a lesser extent, sedimentary detrital origin.

Following is the percentage of component minerals estimated from the thin-section examinations:

quartz grains ave. size 0.45 mm., maximum size 1mm.	40%
chlorite and minor sericite in ground-mass, ave. size 0.003 mm.	20%
plagioclase grains, ave. size 0.35 mm.	15%
orthoclase grains, ave. size 0.4 mm.	10%
calcite grains and veins	10%
opaque mineral grains	3%

These figures (except for the opaque grains) are within the order of accuracy of ± 5%. The quartz grains are generally rounded and have well-defined unaltered margins which suggest that they are water worn detrital grains. Some rounded quartz grains are partly surrounded by a reaction corona of sericite; the margins of these grains are slightly embayed and the embayments are filled with sericite and chlorite. These grains probably have a volcanic origin. Many of the quartz grains are cut by fracture-fill veins of calcite. Minor fragments of chert have the same size as the quartz grains.

Clouded subhedral and anhedral plagioclase grains occur at random through the ground mass. These grains contain abundant irregular patches of sericite and calcite. The extinction angle of twinning in these grains indicates that they have an oligoclase-andesine composition.

Calcite occurs as veins in quartz grains and as patches in feldspar grains. Discrete grains of calcite are also common; their average grain size is 0.2 mm., the maximum size is 2mm.

The groundmass consists almost entirely of chlorite with minor sericite and opaque minerals. Flow textures of the groundmass around quartz grains are rare.

Slide No. 1150

Location: Red Hill Quarry, A.C.T.

Petrology: This is a fragmental rock of which most of the components have a tuffaceous origin. The rock consists essentially of large rounded quartz grains scattered through a heterogeneous crystalline groundmass of mainly quartz and feldspar.

Following is the approximate percent of minerals estimated from a thin-section examination:

quartz grains, ave. size 0.5 mm. maximum size 1.2 mm.	30%
quartz grains in groundmass, ave. size 0.01 mm.	30%
feldspar grains in groundmass, ave. size 0.01 mm.	20%
sericite and minor chlorite in groundmass	10%
opaque mineral grains within groundmass	10%

These figures are within the order of accuracy of ± 5%.

The groundmass makes up about 70% of the rock. It is stained with secondary iron and densely clouded with fine opaque grains and alteration products, therefore it is difficult to make an accurate assessment of the minerals in it. The groundmass appears to be an aggregate of mainly fine volcanic products.

This groundmass contains rounded, clear grains of quartz which have well defined unaltered margins. These may be of volcanic origin, or possibly they are of detrital origin. Several cloudy grains of chert and ? quartzite probably have a detrital source. Some relatively small quartz fragments have a reaction corona of sericite.

The rock is classified as a sandy tuff.

Slide Nos. 818 to 823

Location: Mount Mugga Quarry.

These six slides all represent the rock in the Mt. Mugga Quarry.

Dallwitz has classified the rock as a granodiorite porphyry or a labradorite-quartz-hornblende porphyry corresponding in composition to a granodiorite.

The groundmass has an average grainsize of 0.1 mm. and this makes up about 60% of the rock.

Following is the percentage of component minerals estimated from an examination of the thin-sections:

quartz phenocrysts, ave. size 2 mm. maximum size 5 mm.	20%
plagioclase phenocrysts, ave. size 2 mm.	15%
plagioclase grains in groundmass, ave. size 0.1 mm.	25%
quartz grains in groundmass, ave. size 0.1 mm.	10%
volcanic glass in groundmass, cryptocrystalline	5%
hornblende phenocrysts, ave. size 1 mm.	10%
alteration products of plagioclase; epidote, sericite, chlorite, carbonate	10%
alteration products of amphibole; chlorite, ironoxides, leucoxene	5%
orthoclase,	accessory.

REPORT NO. 25

PETROGRAPHIC EXAMINATION OF CONCRETE AGGREGATE FOR TINDAL AIRSTRIP

by

W. Oldershaw

Field No. 145581 TS 14370

The sample, a 2 inch length of $1\frac{3}{4}$" bore core, is a reddish-grey fine-grained granular rock with a rough hackly fracture. No foliation and no jointing were visible in the sample.

Under the microscope the rock is seen to consist of randomly-orientated euhedral laths of sericitised plagioclase comprising about 60 percent of the rock, irregularly shaped crystals of augite (about 20 percent) and olivine (about 10 percent), set in a matrix of basaltic glass, chlorite, and accessory ilmenite.

The plagioclase occurs as euhedral lath-shaped crystals about 0.5 mm. long. Most of the plagioclase has been altered to sericite, but albite twinning found in a few crystals show them to be andesine.

The augite occurs as irregularly shaped crystals about 0.2 mm long. Some of them are crowded with exsolved plates of hypersthene and some are extensively stained with limonite around their margins and along cracks.

The olivine occurs as irregularly shaped crystals. Most of the crystals have been altered to serpentine and are limonite-stained along cracks.

The matrix of the rock consists of devitrified brown basaltic glass which in places has been chloritised and converted into spherulitic masses of chlorite.

The rock is an olivine-augite andesite which has been extensively altered, either by weathering or, more likely, by autometamorphism. The intense chloritisation and sericitisation would tend to reduce the strength of the rock. This can be determined by means of standard tests for concrete aggregate.

Report No. 26. File No. 120Q/15.
24th September, 1964.

Mineralogical examination of an ilmenite sand and a gabbro from near Abbott Point, Ayr 1:250,000 Sheet, North Queensland.

by

I.R. Pontifex.

Samples submitted by: Dr. N.H. Fisher.

1. Ilmenite sand

Field occurrence: This is a beach sand sample from one mile west of Abbott Point. The beach from which it was collected is adjacent to outcropping gabbro and acid igneous intrusives.

Mineralogy: In the field, the grains which were attracted to a hand magnet were removed, These were presumably magnetite. The remaining sand was separated in the laboratory into 3 fractions on the isodynamic separator and each of these were examined microscopically. A thin and polished section of a random sample of the original sample were also examined.

From these studies the following components were identified and their approximate volumes percent were estimated:

ilmenite containing hematite inclusions	55%
titaniferous hematite	15%
ilmenite	10%
titaniferous magnetite	5%
zircon	8%
hornblende	2%

Minor amounts of epidote, olivine, rutile, tourmaline, leucoxene and pyrite are also present. The average grain size is 0.15 mm. The opaque grains are angular and sub-angular.

The main constituent of this sand, ilmenite, almost invariably contains needle and bleb-like inclusions of titan-hematite oriented along its crystallographic directions. This variety of hematite by definition contains a maximum of 10% TiO_2. The exsolution intergrowth relationship of titan-hematite and ilmenite indicates that the Fe_2O_3 content in the ilmenite exceeds 6%. The grains in which titan-hematite is the dominant mineral commonly carry abundant inclusions of ilmenite-discs. This indicates that the TiO_2 content in the hematite exceeds 10%.

Some homogeneous opaque grains have optical properties intermediate between magnetite and ilmenite; others consist of titaniferous magnetite which contain exsolution blades of ilmenite 0.01 mm. wide. All of these grains are derived from a solid solution of Fe and Ti oxides. Ilmenite is the dominant component since no suggestion of the spinel structure is evident in any grains.

Zircon and hornblende generally have a well defined euhedral form. Commonly hornblende is associated with ilmenite. Epidote, olivine and leucoxene occur as irregular, generally angular, fractured grains; some are sub-rounded. Rutile and tourmaline grains are relatively well rounded.

2. Gabbro

Field occurrence: This is a sample of a gabbro intrusive from 3 miles west of Abbott Point. This intrusive flanks the beach from which the ilmenite sand was collected.

Description of thin section. This rock consists almost entirely of an ophitic aggregate of plagioclase, hornblende and augite. The average grain-size of the plagioclase laths and ferromagnesian grains is 1 mm. and 0.6 mm. respectively.

Euhedral crystals of plagioclase consist mainly of the variety labradorite and these form about 55% of the rock. Some plagioclase is slightly altered to sericite and epidote.

Hornblende forms about 20% of the section; it occurs as anhedral grains and as alteration rims around augite. The hornblende generally contains fine opaque inclusions and it is commonly intergrown with small opaque masses. Some hornblende shows minor alteration to chlorite.

About 15% of the rock consists of anhedral grains of augite; these generally occur as remnant cores surrounded by irregular corona of hornblende.

Description of polished section. Opaque mineral grains have an average size of 0.2 mm. and these form the following approximate proportions of the rock:

ilmenite containing hematite inclusions	3%
titaniferous hematite and magnetite	2%
pyrite	2%
chalcopyrite	<0.5%

The ilmenite containing hematite inclusions forms anhedral grains which are associated with hornblende; it has the same mineralogical composition as the ilmenite-hematite grains in the ilmenite sand previously described. The hematite is the variety titan-hematite and is localised as blebs and needles along the crystallographic directions of the ilmenite host. In some grains hematite is the dominant mineral and these generally carry inclusions of ilmenite blebs.

Grains which have a composition intermediate between magnetite and ilmenite are almost as common as the ilmenite-hematite grains.

Pyrite occurs as discrete anhedral grains. Some pyrite is associated with the iron and titanium oxides.

Chalcopyrite grains up to 0.01 mm. are disseminated through the matrix; these are not associated with the other opaque mineral.

Conclusions

The mineralogical composition of the opaque minerals in the beach sand and in the gabbro is similar; in both places the dominant heavy mineral is ilmenite which contains exsolution intergrowths of titanium-rich hematite. Grains containing various ad-mixtures of iron and titanium oxides which are commonly associated with hornblende are also characteristic of both samples. This evidence suggests that all of these minerals in both samples are genetically related.

The angular nature of the grains and the presence of unaltered hornblende and olivine in the sand suggests that it is relatively near to its source.

These relationships indicate that the gabbro is the source rock for the detrital heavy-minerals, hornblende, and epidote on the adjacent beach.

A minor contribution of detrital minerals from a second provenance is indicated by the presence of zircon and tourmaline in the sand. It is likely that these minerals are derived from the acid igneous intrusives, associated with the gabbro.

REPORT NO. 27

AN EXAMINATION OF SOIL SAMPLES FROM MOUNT AINSLIE AND CAPITOL HILL, A.C.T.

Introduction

This investigation was carried out by I. R. Pontifex B.Sc. (Hons.) in cooperation with the Canberra Police. The soil samples were collected from Mt. Ainslie and Capitol Hill on 6/10/64 under the direction of I. Broomsby of the C.I.B. Soil was also scraped from a pair of boots submitted by I. Broomsby.

Method of Analysis

The clay and fine silt fraction of each sample was separated from the relatively coarse components by sieving. The coarse components were mounted in plastic and a thin-section of each sample was made and examined under a petrological microscope. The various minerals and rock fragments were identified and the proportions of these in each sample was estimated, generally within the order of accuracy of about ± 5%.

Samples from Mt. Ainslie

(Thin-section nos. 14450, 14451)

Two soil samples were collected from foot-prints (as indicated by I. Broomsby) from ¼ mile N.N.E. of the Australian War Museum.

The mineralogical composition of both samples is essentially the same and following is the percentage of the component minerals estimated from the thin-section examinations.

Fragments of porphyritic-tuff	60%
Free grains of altered quartz	20%
Free grains of unaltered quartz	15%
Free plagioclase-felspar grains	3%
Free biotite grains	2%

About 30% of the components are stained with iron oxides.

The fragments of porphyritic-tuff consist of a fine crystalline siliceous ground-mass which contains relatively coarse-grained inclusions of quartz grains and minor plagioclase, biotite, chlorite and opaque grains. The groundmass is clouded with sericite and fine opaque grains.

The quartz inclusions have both anhedral and euhedral form. Commonly they are partly surrounded by a corona of sericite and fine quartz. Many quartz grains have embayed margins.

These fragments are derived from a fragmental rock of volcanic origin. This is the rock type underlying the soil at this locality.

The free grains of quartz, plagioclase and biotite commonly have the same characteristics as the quartz, plagioclase and biotite inclusions in the fragments of tuff. These free grains are the detrital products produced by the decomposition of the porphyritic-tuff.

Samples from Capitol Hill

(Thin-section no. 14449)

This sample was collected from an area within 50 yards radius of the north end of "Hut C" in the Capitol Hill Mens' Hostel.

The mineralogical composition estimated from an examination of the thin-section is:-

Fragments of sedimentary, detrital origin including quartzite, siltstone and sub-greywacke	60%
Quartz grains	30%
Free opaque grains	5%
Frre orthoclase-felspar grains	5%

About 20% of the components are stained with iron oxides.

The fragments of quartzite and siltstone consist of allotriomorphic, more or less eque-granular aggregates of quartz grains. The intergranular boundaries are commonly sutured. These aggregates contain various amounts of interstitial sericite. Some gragments of rock consist of a heterogeneous mixture of quartz grains of various sizes and detrital matrix. These are fragments of a sub-greywacke rock-type.

All these rock fragments are the residual products of weathering of the sedimentary rocks which underly the soil at this locality.

The free grains of quartz and orthoclase are sub-rounded; the quartz is not generally associated with any alteration products. These grains probably derived from the underlying rocks.

Samples from the Boots

The mineralogical composition of the rock fragments in the soil scraped from each boot is essentially the same. Following are the percentages of the components detected in thin-section.

Right Boot

(Thin-section no. 14447)

Fragments of porphyritic-tuff	40%
Fragments of sedimentary rocks including quartzite, siltstone and sub-greywacke	25%
Altered free quartz grains	15%
Unaltered free quartz grains	5%
Free plagioclase-felspar grains	10%
Grains of biotite and hornblende	5%

About 20% of the components are stained with iron oxides.

The fragments of porphyritic-tuff consist of a fine crystalline groundmass of quartz and sericite which contains inclusions of fragmental quartz and minor plagioclase, biotite and chlorite. These fragments have a volcanic origin.

The fragments of quartzite and siltstone consist of an allotriomorphic granular aggregate of quartz grains with varying amounts of interstitial sericite. Many of the inter-granular boundaries are sutured. Some rock fragments of apparent sedimentary detrital origin contain a heterogeneous mixture of quartz grains of different size. These are fragments of sub-greywacke.

Summary and Conclusions

The coarse components in the top soil from the Mt. Ainslie locality consist mainly of fragments of a porphyritic-tuff. Subordinate amounts of quartz, plagioclase and biotite grains are also present and these are derived from the tuff. All of these components have a volcanic origin.

The coarse components in the soil from the Capitol Hill locality consist mainly of fragments of quartzite, siltstone and sub-greywacke. Subordinate amounts of quartz and orthoclase grains are also present and these are probably derived from sedimentary rocks. All these components have a sedimentary origin.

The mineralogical composition of the rock fragments in the soil from each locality is different and this difference can be readily distinguished microscopically. The free grains of quartz in the soils can not be used to distinguish between the soils from the two localities. The free grains of plagioclase occur at the Mt. Ainslie locality only.

The coarse components in the soil from the boots consist of fragments of porphyritic-tuff, fragments of quartzite, siltstone and greywacke together with free grains of quartz, plagioclase and minor hornblende.

The following examination shows that:-

(a) some of the components in the soil scraped from the boots have a similar mineralogical composition to the rock fragments and plagioclase grains in the soil from Mt. Ainslie.

(b) other components in the soil from the boots have a similar mineralogical composition to the rock fragments in the soil from Capitol Hill.

145ACT/1
3rd Nov.1964

REPORT No.28.

WATER SAMPLE ANALYSIS - CAPTAINS FLAT MINE

by

N.W. Le Roux

This sample was collected from mine water emerging from the air vent at the northern end of Elliots orebody. The water diverged, the major part flowing into the pool and part flowing over the dam wall towards the Molonglo. The water in the pool itself drains into the Molonglo via a sump drain.

Analysis.

Zn	3000 p.p.m.
Cu	approx. 0.1 p.p.m.
$SO_4^{=}$	present in substantial amount
Fe^{2+}	1120 p.p.m.
Fe total	1185 p.p.m.
Fe^{3+} (by difference)	65 p.p.m.
As	approx 0.1 p.p.m.
Sb	not detected at a detection limit of 0.2 p.p.m.
pH	3.6
Pb	2.0 p.p.m.

REPORT NO. 29 30th October, 1964

POSSIBLE BUILDING STONES FROM NEAR CANBERRA

by

W. Oldershaw

A series of rocks which may be suitable for building stones was submitted by D.E. Gardner for petrographic examination.

R. 17557 TSR 13771 FN 688

Black Limestone

The specimen is a black limestone with straight parallel veins of white calcite 0.5 - 5 mm. thick. The rock parts with a hackly fracture and not along the veins when broken and there is a strong smell of hydrogen sulphide. A sample digested in dilute hydrochloric acid was found to contain 1.85 percent of insoluble residue, 80 percent of which was carbon, the rest being clay and fragments of quartz.

Under the microscope the rock is seen to consist of minute spheres 0.1 mm. across of fine-grained black calcite and fragments of calcareous fossil shells 1 mm. across set in a matrix of clear crystalline calcite. The veins cutting the rock consist of white coarsely crystalline calcite; the central parts of the veins being coarser-grained than the marginal parts. The vein walls are clear and sharp, but the crystals in the veins appear to be welded onto the wall-rock by means of minute intergrowths. Some crystals in the wall-rock are continuous across the veins. The limestone appears to have been recrystallised after the injection of the calcite veins.

The rock takes a good polish and would produce an interior facing stone of striking appearance. It does not part along the calcite veins and should be capable of being sawn into large slabs.

R 17558 TS 13772 FN 691

Argillaceous Limestone

The specimen is a grey pyritic limestone containing wisps of brown shale and veins of white calcite. The rock has been contorted and a few polished black shear planes were noted.

Under the microscope the major part of the rock is seen to consist of interlocking crystals of brown calcite about 0.5 mm. across. The rock is cut by ramifying veins 1-10 mm. across of fine-grained granular white calcite (grainsize about 0.1 mm.). The margins of the veins are minutely irregular and intergrown. The crystals in the veins are intergrown and recrystallized, probably by stress. The rock contains wisps and sheaves of parallel flakes of colourless sericite. In places these are stained with limonite. Pyrite occurs as groups up to 0.4 mm. across of 5 to 10 minute cubes associated with the wisps and sheaves of sericite.

On digesting the rock in dilute hydrochloric acid, a residue of sericite (some limonite stained), pyrite and graphite comprising 9 percent of the rock was left.

The rock would appear to be suitable for use as a road base.

R 17559 TS 13773 R690

Marble

The sample is a fragment of a fine-grained marble with a marked conchoidal fracture. Fresh broken surfaces show it to be a light grey rock, but it weathers to pale brown on exposed surfaces. The rock contains thin dark-grey parallel lamellae $\frac{1}{2}$ to $\frac{1}{8}$ inch apart.

Under the microscope the rock is seen to consist of an equigranular mosaic of interlocking grains of calcite about 0.1 mm. across. There are numerous thin straight parallel bands of graphite with a few cubes of pyrite and chalcopyrite. No quartz and no silicates were found.

On digesting a sample in dilute hydrochloric acid a residue of graphite, illite and pyrite comprising 0.52 percent of the rock was obtained.

R 17560 TS 13774 FN 689

Andesite

The specimen is a greenish-grey granular rock composed of fragments and rounded grains of quartz and fragments of dark grey mafic minerals and greenish grey feldspars set in a grey fine-grained matrix.

Under the microscope the rock is seen to consist of embayed euhedral phenocrysts and fragments of quartz 2-4 mm. across, sericitised plagioclase, chloritised biotite and patches of penninite set in a fine-grained matrix, comprising about 40 percent of the rock, of intergrown crystals of quartz, feldspar and chlorite and limonite dust.

Quartz comprises about 50 percent of the phenocrysts and occurs as angular fragments and as embayed euhedral crystals.

Plagioclase comprises about 30 percent of the phenocrysts and occurs as fresh, irregularly shaped, well-twinned crystals of andesine and as intensely sericitised crystals of indeterminable plagioclase.

Chloritised biotite comprises about 10 percent of the phenocrysts. The biotite has been altered to masses of penninite; but the original cleavage planes are marked by trails of minute grains of hematite.

Subhedral masses of penninite, epidote and calcite 1-2 mm. across are probably altered hornblende.

Accessory grains of hematite, zircon and apatite are scattered through the rock.

The rock is a highly altered andesite. No deleterious minerals were noted. The rock takes a good polish and would appear to be suitable for use as a dark facing stone.

R 17561 TS 13775 FN 692

Sandstone

The sample is a buff-coloured fine-grained sandstone with dark brown iron stains on the weathered face and on one side of a thin vein of quartz. The few joint planes in the sample are coated with limonite.

Under the microscope the rock is seen to consist of closely packed poorly sorted rounded to sub-rounded grains of quartz from 0.1 - 0.5 mm. across with interstitial chert and illite. The grains consist of clear quartz (some crowded with needles of rutile), cloudy quartz, and chert. Small rounded grains of tourmaline, epidote, zircon and apatite are common. Most of the grains of quartz are surrounded by irregular pellicles of secondary quartz in optical continuity with the enclosed grains. The interstices between the grains are filled with a fine-grained intergrowth of quartz crystals. This matrix contains scattered flakes and masses of illite and sericite, many of the flakes orientated normal to the margins of the adjacent quartz crystals. These flaky minerals are intensely iron stained close to joint planes and quartz veins.

The sample was not large enough to enable the routine physical tests to be carried out. The poor sorting and close packing of the grains of quartz and the siliceous cement, would tend to make the sandstone very strong and stable and not very porous. The iron in the rock is unstable and appears to migrate to weathered surfaces and to joints and veins. The rock may thus discolour readily, but this may or may not be a desirable feature.

REPORT NO. 30.

CITRATE - SOLUBLE COPPER AND ZINC IN STREAM SEDIMENTS FROM THE ASTROLABE AREA, T.P.N.G.

by

J.R. Beevers

The stream sediments were through 80 P.S.S. mesh fractions. The analyses reported represents the copper and zinc that is extracted by cold 10% ammonium citrate.

The samples were submitted by K.R. Yates.

Sample No.	Cu (ppm)	Zn (ppm)
07002	<0.5	3
7	<0.5	<2
07011	2.0	12
18	<0.5	4
24	<0.5	<2
32	<0.5	<2
36	<0.5	3
41	<0.5	<2
48	1.3	<2
59	1.5	<2
70	<0.5	<2
78	0.3	<2
86	2.0	<2
91	20.0	<2
99	<0.5	<2
070104	<0.5	<2
112	<0.5	<2
120	2.0	<2
128	1.3	<2
137	<0.5	4
143	2.5	<2
149	10.0	<2
158	<0.5	<2
070168	<0.5	<2
177	<0.8	<2
184	<0.5	<2
204	4.5	<2
210	1.0	<2
216	4.0	<2
222	50.0	<2
231	<0.5	<2
238	<0.5	<2

2.

Sample No.	Cu (ppm)	Zn (ppm)
070246	<0.5	<2
250	<0.5	<2
309	<0.5	<2
313	<0.5	<2
319	1.8	<2
326	<0.5	<2
340	<0.5	<2
348	2.5	<2
404	<0.5	<2
408	<0.5	<2
415	<0.5	<2
423	<0.5	<2
431	<0.5	<2
451	<0.5	<2
459	<0.5	<2
070004	<0.5	10
5	<0.5	<2
6	<0.5	3
8	<0.5	7
9	<0.5	5
07010	<0.5	6
14	3.0	2
16	8.8	7
17	1.0	2
19	4.0	3
20	<0.5	6
23	1.5	3
070026	1.0	3
28	5.0	2
31	2.5	9
33	3.0	3
34	<0.5	5
35	<0.5	4
37	11.3	5
38	<0.5	4
40	<0.5	8
43	<0.5	3
45	<0.5	4
47	<0.5	14
50	<0.5	10
53	<0.5	5
56	<0.5	6

3.

Sample No.	Cu (ppm)	Zn (ppm)
070061	<0.5	4
64	<0.5	8
67	<0.5	4
72	<0.5	3
75	2.5	5
76	1.0	<2
80	<0.5	3
82	<0.5	3
85	<0.5	3
88	2.0	6
89	<0.5	6
90	<0.5	6
94	8.3	8
96	0.5	4
97	1.5	7
070100	<0.5	6
102	<0.5	<2
103	<0.5	<2
105	1.0	3
108	2.0	3
109	2.5	<2
113	1.8	3
116	0.5	<2
122	0.8	<2
124	4.7	<2
126	<0.5	3
131	<0.5	6
132	<0.5	3
134	4.7	<2
138	7.5	3
140	<0.5	4
142	9.0	4
144	<0.5	3
148	<0.5	24
153	<0.5	4
154	2.5	4
155	<0.5	4
162	<0.5	<2
164	<0.5	<2
166	<0.5	<2
170	<0.5	<2
172	<0.5	3

Sample No.	Cu (ppm)	Zn (ppm)
070175	<0.5	3
179	<0.5	<2
181	<0.5	<2
183	<0.5	<2
187	<0.5	<2
189	<0.5	4
202	4.5	5
205	<0.5	<2
208	3.0	5
209	<0.5	4
211	<0.5	3
213	33.0	12
215	1.0	<2
218	<0.5	<2
223	<0.5	<2
225	17.0	<2
233	<0.5	4
240	<0.5	3
242	2.5	4
244	<0.5	<2
247	2.0	3
248	20.0	7
249	2.5	<2
301	<0.5	<2
303	<0.5	3
305	<0.5	3
310	<0.5	6
311	<0.5	8
312	<0.5	4
316	<0.5	4
317	2.5	6
318	2.0	4
319	1.0	4
320	<0.5	4
322	<0.5	3
324	<0.5	3
326	<0.5	3
327	<0.5	<2
329	4.5	3
330	<0.5	4
332	<0.5	3
334	<0.5	<2
336	<0.5	<2

Sample No.	Cu(ppm)	Zn(ppm)
070338	4.5	2
340	0.5	2
342	0.5	3
344	2.5	2
346	2.5	3
348	0.5	2
401	1.0	2
402	1.0	2
403	0.5	2
404	<0.5	<2
405	2.5	<2
406	<0.5	4
408	<0.5	<2
410	<0.5	<2
411	<0.5	3
413	<0.5	3
415	<0.5	3
416	<0.5	<2
417	<0.5	<2
420	<0.5	<2
423	<0.5	<2
424	<0.5	<2
427	<0.5	<2
430	1.0	<2
431	<0.5	<2
432	<0.5	<2
434	<0.5	<2
436	2.0	<2
451	<0.5	<2
453	<0.5	<2
455	<0.5	<2
457	2.0	<2
459	<0.5	<2
461	2.0	4
462	<0.5	3
465	<0.5	<2
070191	<0.5	6
193	<0.5	<2
194	<0.5	<2
197	<0.5	<2
199	<0.5	3
251	<0.5	<2
252	<0.5	<2
253	<0.5	3

Sample No.	Cu(ppm)	Zn(ppm)
070254	<0.5	<2
255	<0.5	5
265	<0.5	<2
266	<0.5	<2
269	<0.5	<2
270	<0.5	<2
272	<0.5	<2
274	<0.5	<2
275	<0.5	8
276	<0.5	6
277	<0.5	<2
279	<0.5	<2
350	<0.5	<2
351	<0.5	<2
353	<0.5	<2
355	7.2	3
356	4.5	<2
357	<0.5	5
358	<0.5	<2
359	<0.5	<2
360	<0.5	<2
361	4.2	<2
362	<0.5	<2
363	<0.5	<2
365	3.0	4
367	<0.5	<2
369	<0.5	<2
371	0.9	<2
373	<0.5	<2
375	0.8	<2
377	<0.5	<2
379	0.8	<2
381	0.8	<2
383	<0.5	<2
385	0.8	<2
387	<0.5	<2
389	<0.5	<2
391	<0.5	<2
393	<0.5	<2
398	0.8	<2
400	<0.5	<2
438	0.8	4
439	<0.5	<2
440	3.0	<2

Sample No.	Cu(ppm)	Zn(ppm)
070441	<0.5	3
442	1.5	<2
443	2.7	3
444	2.3	<2
445	2.3	3
448	1.5	<2
450	2.7	<2
468	1.5	<2
470	1.5	<2
471	1.5	4
474	1.5	<2
475	0.8	3
476	<0.5	3
479	1.5	3
480	<0.5	<2
481	5.3	<2
482	1.2	<2
483	1.5	<2
485	3.0	3
487	0.8	<2
489	<0.5	<2
490	<0.5	<2
491	<0.5	<2
492	1.5	<2
494	<0.5	<2
496	0.8	<2
498	<0.5	<2
500	<0.5	<2
502	<0.5	<2
504	<0.5	<2
506	0.8	<2
507	<0.5	<2
508	<0.5	<2
510	<0.5	3
512	2.3	<2
515	<0.5	<2
516	<0.5	<2
511	0.8	<2
517	<0.5	<2
518	0.8	<2
519	<0.5	<2
521	<0.5	<2
522	<0.5	<2
524	<0.5	<2

Sample No.	Cu(ppm)	Zn(ppm)
070526	<0.5	<2
528	<0.5	<2
530	0.8	<2
532	<0.5	<2
534	1.5	<2
535	<0.5	<2
537	1.5	<2
538	<0.5	<2
539	<0.5	<2
541	1.5	<2
543	0.8	<2
545	1.5	<2

REPORT NO. 31 3rd November, 1964.

CITRATE-SOLUBLE COPPER IN STREAM SEDIMENTS FROM THE ASTROLABE AREA, T.P.N.G.

by

J.R. Beevers

The stream sediments submitted by K.R. Yates were the through 80 B.S.S. mesh fractions. The analyses represent copper that is extracted by cold 10% ammonium citrate.

Sample No.	Cu (ppm)
070601	<0.5
070603	<0.5
070605	<0.5
070606	<0.5
070607	<0.5
070609	1.5
070610	4.5
070612	<0.5
070614	1.5
070616	0.8
070618	1.5
070620	1.2
070622	<0.5
070624	<0.5
070626	<0.5
070628	<0.5
070630	0.8
070632	<0.5
070634	<0.5
070636	<0.5
070637	3.6
070638	1.0
070640	<0.5
070642	9.0
070643	<0.5
070646	<0.5
070647	<0.5
070649	<0.5
070651	<0.5
070653	<0.5
070655	<0.5
070657	4.0
070659	10.0
070661	4.0
070663	2.0
070665	<0.5
070667	<0.5
070669	1.6
070671	4.0
070673	2.0
070675	1.0
07013	40.0
070284	<0.5
070285	2.0
070286	2.0
070287	30.0
070289	4.0
070290	<0.5
070291	<0.5
070293	304.0

Sample No.	Cu (ppm)
070295	30.0
070536	2.0
070546	<0.5
070547	<0.5
070548	1.6
070549	0.8
070550	< 0.5
070551	2.0
070552	< 0.5
070553	<0.5
070297	1.6
070299	1.0
070554	3.0
070555	<0.5
070556	<0.5
070557	1.0
070558	1.6
070559	0.6
070560	< 0.5
070561	0.6
070562	<0.5
070563	<0.5
070564	<0.5
070565	<0.5
070566	<0.5
070567	0.6
070568	5.0
070569	<0.5
070570	<0.5
070571	1.0
070572	0.6
070573	0.6
070574	0.6
070575	< 0.5
070576	<0.5
070577	<0.5
070578	2.0
070579	<0.5
070580	1.6
070581	<0.5
070582	<0.5
070583	<0.5
070584	<0.5
070585	<0.5
070586	<0.5
070587	<0.5
070588	<0.5
070589	<0.5
070592	1.0
070593	<0.5
070594	1.0
070595	<0.5
070596	1.0
070599	<0.5
070600	<0.5
070677	<0.5
070678	1.0
070679	1.0
070681	<0.5
070683	<0.5
070685	<0.5
070687	<0.5
070684	1.0
070691	< 0.5
070697	< 0.5

Sample No.	Cu (ppm)
070699	1.0
070701	<0.5
070704	<0.5
070706	<0.5
070707	<0.5
070709	<0.5
070710	<0.5
070711	<0.5
070712	<0.5
070714	<0.5
070717	1.0
070719	<0.5
070720	<0.5
070723	<0.5
070724	<0.5
070725	<0.5
070726	<0.5
070728	<0.5
070729	<0.5
070731	<0.5
070732	<0.5
070734	<0.5
070736	1.0
070738	<0.5
070740	<0.5
070742	1.0
070744	<0.5
070746	1.0
070747	<0.5
070748	<0.5
070749	<0.5
070751	<0.5
070752	<0.5
070753	<0.5
070754	<0.5
070755	<0.5
070756	<0.5
070757	<0.5
070758	<0.5
070760	<0.5
070762	<0.5
070763	1.0
070764	<0.5
070765	<0.5
070766	<0.5
070767	<0.5
070768	<0.5
070770	<0.5
070772	1.0
070773	<0.5
070774	1.0
070776	<0.5
070777	<0.5
070778	<0.5
070779	<0.5
070781	Insufficient Sample
070892	<0.5
070783	<0.5
070784	3.0
070785	1.6
070786	<0.5
070787	<0.6
070788	1.0
070789	2.0
070716	<0.5

Sample No.	Cu (ppm)
070721	<0.5
070791	<0.5
070792	<0.5
070793	<0.5
070795	1.0
070794	<0.5
070796	1.0
070797	<0.5
070799	<0.5
070800	<0.5
070801	1.6
070802	<0.5
070803	2.0
070804	1.0
070805	1.0
070806	<0.5
070807	1.0
070808	1.6
070809	<0.5
070810	<0.5
070874	2.0
070876	1.0
070877	<0.5
070878	<0.5
070879	<0.5
070881	1.6
070883	<0.5
070884	<0.5
070886	1.0
070888	<0.5
070889	<0.5
070890	<0.5
070894	<0.5
070896	<0.5
070898	<0.5
070900	2.0
070914	<0.5
070951	<0.5
070953	<0.5
070955	<0.5
070957	<0.5
070959	<0.5
070960	<0.5
070961	<0.5
070962	<0.5
070963	<0.5
070965	<0.5
070966	1.0
070967	<0.5
070969	<0.5
070970	<0.5
070972	<0.5
070974	<0.5
070976	<0.5
070978	<0.5
070979	90.0
0701012	<0.5
0701015	<0.5
0701016	<0.5
0701018	<0.5
0701020	<0.5
0701022	90.0
0701023	54.0
0701024	4.0
0701025	<0.5

Sample No.	Cu (ppm)
0701026	18.0
0701027	< 0.5
0701028	<0.5
0701038	<0.5
0701051	<0.5
0701052	104.0
0701054	<0.5
0701056	<0.5
0701057	<0.5
0701059	<0.5
0701061	104.0
0701063	1.0
0701065	<0.5
0701067	<0.5
0701069	<0.5
0701070	<0.5
0701072	<0.5
0701075	<0.5
0701076	<0.5
0701078	<0.5
0701080	<0.5
0701082	<0.5
0701084	<0.5
0701086	<0.5
0701088	<0.5
0701090	<0.5
0701092	<0.5
0701094	1.0
0701096	<0.5
0701098	<0.5
0701100	<0.5
0701102	<0.5
0701103	<0.5
0701104	<0.5
0701105	<0.5
0701107	0.6
0701109	<0.5
0701110	<0.5
0701112	<0.5
0701114	<0.5
0701116	<0.5
0701117	<0.5
0701118	<0.5
0701120	<0.5
0701122	<0.5
0701124	0.6
0701126	<0.5
0701128	4.0
0701129	<0.5
0701131	<0.5
0701132	<0.5
0701134	<0.5
0701136	<0.5
0701138	<0.5
0701140	1.0
0701142	<0.5
0701144	<0.5
0701146	0.6
0701148	<0.5
0701150	<0.5
0701152	0.6

Sample No.	Cu (ppm)
0701153	0.6
0701155	<0.5
0701156	0.6
0701158	<0.5
0701160	<0.5
0701162	<0.5
0701164	<0.5
0701166	<0.5
0701168	<0.5
0701170	<0.5

Report No.32

Trace Element Analysis of Sediment from Streams in New Guinea

by

A.L. Mather

Following are analytical results for trace elements in active sediments collected from streams in the Port Moresby - Kwikila coastal area of Papua. These samples were submitted in a wet condition and after the determination of citrate soluble metals (see reports by R. Beevers), magnetite was removed from the sediments with a hand magnet. An atomic absorption spectrophotometer was used to determine aqua regia soluble copper, zinc, nickel and cobalt in the magnetite-free sediments. The samples were submitted by K. Yates.

Registered Number	Cu	Zn	Ni	Co
64070153	57	52	42	20
154	103	71	104	22
155	60	80	50	26
158	42	39	30	17
162	87	23	37	22
164	121	37	57	26
166	60	46	65	25
168	70	50	67	27
170	88	88	81	28
172	72	83	65	30
175	31	24	17	17
177	40	60	47	24
179	21	26	12	12
181	42	27	25	12
183	32	28	25	15
184	65	42	40	20
187	28	25	20	12
189	55	35	42	20
191	90	72	81	38
193	51	38	70	22
194	65	39	137	30
197	46	42	76	30
199	40	36	64	24
202	64	45	37	12
204	96	66	80	40
205	50	13	23	10
208	121	78	100	44
209	64	52	46	15
210	67	68	64	32
211	50	48	17	20
213	375	120	57	27
64070215	60	57	55	26

Registered Number	Cu	Zn	Ni	Co
64070216	50	14	37	15
218	31	22	32	20
220	54	41	32	4
221	102	80	55	30
223	31	22	17	12
225	52	62	52	17
229	65	34	47	12
231	98	37	90	25
233	69	44	58	25
235	50	28	30	17
236	121	74	55	25
238	43	58	32	22
240	72	68	70	32
242	55	44	45	15
244	73	36	62	24
246	106	92	78	30
247	106	78	70	20
248	85	67	85	22
249	96	67	70	22
250	98	62	60	12
251	70	75	70	34
254	58	62	65	22
255	75	85	62	22
265	87	44	72	36
266	75	60	51	30
269	87	50	58	26
270	106	60	90	38
272	113	52	102	36
274	76	41	176	30
275	79	66	72	38
277	119	46	50	22
279	58	87	50	26
301	71	66	52	20
303	77	65	65	22
305	77	78	60	30
309	119	47	56	17
310	69	62	56	19
311	76	58	70	25
312	51	51	45	19
313	82	67	70	25
316	69	67	70	30
317	100	83	82	24
318	106	117	80	26
64070319	63	56	62	22

Registered Number	Cu	Zn	Ni	Co
64070320	55	49	60	17
322	38	46	48	22
324	77	56	62	26
326	42	42	50	15
327	48	54	45	13
329	90	63	82	22
330	87	53	65	25
332	57	74	62	19
334	80	70	62	50
336	70	57	60	35
338	85	62	70	35
340	88	54	85	38
342	41	47	50	24
344	65	54	60	34
346	84	81	82	32
348	63	62	66	25
351	70	57	96	35
353	58	34	55	24
355	116	77	122	60
356	67	59	55	32
357	156	85	55	17
358	115	57	50	30
360	78	62	72	38
361	115	86	82	37
363	83	120	58	32
369	75	54	60	32
371	85	62	64	32
373	88	51	72	42
375	131	60	87	48
377	80	45	66	35
379	61	45	55	24
401	65	67	50	22
402	75	64	52	24
403	98	90	70	50
404	61	60	46	30
405	77	64	70	32
406	107	95	90	38
407	108	83	70	38
408	74	72	64	48
410	80	76	56	37
411	87	70	56	35
64070413	83	72	60	37

Registered Number	Cu	Zn	Ni	Co
64070415	87	60	64	38
416	114	78	80	48
417	78	57	60	37
420	67	36	56	24
423	95	67	66	42
424	51	40	56	26
427	100	50	82	37
430	91	62	73	35
431	89	67	76	37
432	95	67	82	37
434	95	51	70	24
436	84	43	73	26
451	74	54	50	26
453	61	44	60	29
457	53	35	44	22
252	95	100	66	25
253	82	130	35	18
276	80	82	52	35
282	74	80	52	32
284	112	73	65	37
285	121	95	60	37
286	130	200	75	55
287	88	90	60	28
289	100	38	112	28
290	138	38	116	33
291	70	42	50	15
293	920	310	55	24
295	300	107	75	30
350	91	88	66	42
359	108	64	58	30
362	103	80	74	57
365	86	70	47	35
367	122	73	94	50
381	106	59	88	45
383	129	80	66	47
385	72	105	42	30
387	82	53	37	30
389	79	42	40	32
391	86	47	42	28
393	97	73	54	40
395	89	77	56	40
398	62	50	40	27
64070400	82	82	82	50

Registered Number	Cu	Zn	Ni	Co
64070438	108	88	66	45
439	79	62	58	45
440	104	180	78	62
441	113	150	82	70
442	92	51	56	32
443	104	90	56	35
444	123	150	71	47
445	80	79	54	37
448	82	51	56	37
450	93	100	54	45
455	106	62	71	45
459	89	49	58	35
461	80	69	58	39
462	100	59	56	37
465	89	61	54	35
468	89	76	56	42
470	115	91	52	32
471	56	66	37	30
474	94	88	54	45
475	100	95	40	45
476	108	59	54	40
479	75	65	45	30
480	32	36	25	14
481	95	65	56	25
482	103	74	64	35
483	75	51	52	30
485	89	62	58	40
487	82	51	54	30
489	34	59	27	14
490	35	52	27	14
491	38	59	32	11
492	96	88	62	29
494	107	88	62	34
496	84	41	54	30
498	80	69	54	30
500	57	42	21	30
502	93	45	56	31
504	97	54	58	27
506	84	50	45	27
507	105	77	42	65
508	82	50	52	29
510	106	88	94	80
64070511	75	65	54	30

Registered Number	Cu	Zn	Ni	Co
64070512	77	59	52	25
515	80	82	54	37
516	84	43	45	27
517	95	55	54	37
518	142	91	68	55
519	79	40	37	32
521	40	55	30	14
522	110	67	54	47
524	110	67	62	55
526	125	62	58	39
528	60	67	32	30
530	87	67	54	37
532	155	71	148	47
534	152	88	114	55
535	181	82	65	45
536	158	100	85	55
537	134	74	76	57
538	32	85	25	21
539	47	42	27	21
541	93	37	17	27
543	72	48	17	32
545	55	42	37	27
546	79	125	60	33
547	57	68	42	24
549	76	72	55	33
550	70	53	46	33
551	74	78	50	37
583	79	38	65	28
584	70	73	46	28
585	88	65	60	35
601	89	42	54	37
603	140	150	78	47
605	103	74	54	42
606	133	180	58	24
607	87	52	50	44
609	129	62	47	62
610	202	130	50	40
612	98	37	52	27
614	98	34	78	32
616	98	49	64	25
618	108	36	45	23
620	67	42	37	18
622	82	n.d.	50	27
64070624	72	32	37	21

n.d. = not determined

Registered Number	Cu	Zn	Ni	Co
64070626	82	32	42	28
628	69	37	52	27
630	60	29	37	21
632	73	42	38	28
634	57	40	29	28
636	38	45	46	33
637	70	63	50	28
638	63	44	38	19
640	66	45	38	24
642	110	57	85	50
643	67	33	42	26
646	63	22	29	15
647	63	33	29	19
649	79	37	42	26
651	97	52	54	30
653	99	50	55	28
655	82	43	38	24
657	82	35	34	28
659	96	53	46	28
661	118	55	80	55
663	73	35	38	26
665	90	52	46	28
667	116	57	65	33
669	98	65	55	37
671	68	43	34	15
673	63	43	46	24
64070 675	73	45	46	28

Lab. Serial Nos. 1540 and 1828.

Report No. 33.

Trace Element Analysis of Sediment from Streams in Papua.

by

A.L. Mather

Following are analytical results for trace elements in active sediments collected from streams in the Port Moresby-Kwikila coastal area of Papua. These samples were submitted in a wet condition and after the determination of citrate-soluble metals (see reports by R. Beevers), magnetite was removed from the sediments with a hand magnet. An atomic absorption spectrophotometer was used to determine aqua regia-soluble copper, zinc and nickel on the magnetite free samples. Cobalt was determined on sixteen of these. The samples were submitted by K. Yates.

Registered Number	Cu	Zn	Ni	Co
64070002	22	55	15	20
4	27	60	21	25
5	27	53	21	36
6	66	47	52	30
7	40	60	37	28
8	106	78	65	30
9	75	67	62	30
10	55	55	52	31
11	72	60	12	10
14	27	37	23	10
16	100	93	65	17
17	45	55	45	17
18	55	75	75	31
19	62	65	62	35
20	12	45	18	22
23	32	35	32	17
24	40	26	22	n.d.
26	58	55	55	n.d.
28	42	33	29	n.d.
31	43	56	35	n.d.
32	66	63	42	n.d.
33	42	62	25	n.d.
34	88	77	55	n.d.
35	73	43	42	n.d.
36	87	62	70	n.d.
37	155	77	97	n.d.
38	60	37	35	n.d.
40	76	68	55	n.d.
41	45	36	35	n.d.
6407043	42	32	25	n.d.

n.d.= not determined.

Registered Number	Cu	Zn	Ni
64070044	32	21	22
47	50	50	20
48	85	60	68
50	55	51	42
53	84	47	72
56	60	39	42
59	42	32	29
61	37	31	35
64	42	41	35
67	40	46	42
70	42	65	42
72	65	46	59
75	63	43	45
76	63	41	55
78	62	58	48
80	77	45	43
82	42	27	30
85	48	52	32
86	31	22	25
88	55	54	50
89	63	56	48
90	54	50	35
91	50	62	60
94	60	65	52
96	36	33	34
97	60	49	43
99	57	52	81
100	40	30	32
102	15	17	10
103	14	27	12
104	10	15	7
105	58	56	43
108	51	52	45
109	58	45	34
112	46	49	34
113	38	45	25
116	27	27	17
118	50	61	47
120	59	55	61
122	48	42	32
124	154	54	67
126	79	53	50
64070128	70	49	40

Registered Number	Cu	Zn	Ni
64070131	105	97	107
132	84	56	73
134	147	57	45
137	62	54	48
138	158	60	42
140	172	77	57
143	90	64	65
144	52	48	42
64070 149	187	100	48.

Lab. Serial No. 1540

76

Report No. 34.
198 PNG/1
24/11/64

Mineragraphic investigation of a specimen from Mount Victor Gold Mine, Kainantu, New Guinea

by

I.R. Pontifex

Introduction

In April this year I made a mineragraphic examination of sample No. RH48 from No.3 level Mt. Victor Mine and I found minor sulphide minerals in the ore. Since this was the first time the presence of copper minerals in this mine had been recorded I suggested that more material from it should be studied.

Accordingly the specimen described in this report was submitted by R. Horne for an investigation of the copper content.

Ore minerals identified

Pyrite, chalcopyrite, chalcocite, covellite, magnetite, ?enargite.

Copper Assay.

0.18% Cu (X-ray spectrograph determination).

Field occurrence

The lode geology of the Mount Victor prospect is described by Dow and Plane, B.M.R. Record 1963/64.

Description of hand specimen.

This specimen consists mainly of a brecciated granular aggregate of pyrite. Green-grey talcose material and lesser amounts of a white clay fill interstices within the aggregate.

Description of polished section.

Four sections were examined. About 80% of each section consists of a brecciated granular aggregate of pyrite.

Chalcopyrite makes up about 5% of one section but less than 2% of the others. The chalcopyrite generally occurs in irregular embayments in pyrite which border the major viens filling interstices in the pyrite aggregate. Some chalcopyrite occurs as discrete masses in the talcose material.

Most of the chalcopyrite masses are surrounded by alteration corona of various amounts of chalcocite and covellite. Some chalcopyrite has been completely replaced by these two minerals.

The maximum size of the patches of copper sulphides is about 0.4 mm. by 0.2 mm. Smaller blebs and stringers of chalcopyrite fill voids and fine fractures in pyrite grains.

Minor accessory, sub-rounded inclusions of a mineral which has the optical properties of enargite occur in some grains of pyrite. These measure about 0.03 mm. The restricted occurrence of this mineral prevented a positive identification being made.

Accessory, sub-rounded magnetite grains occur as inclusions in some grains of pyrite.

Conclusions

Pyrite is the most abundant mineral in this specimen; it is brecciated and granular. Chalcopyrite and an associated talcose gangue have been deposited in the interstices and fractures of the pyrite aggregate. The chalcocite and covellite are derived from chalcopyrite probably by the process of supergene alteration. Magnetite appears to be genetically related to pyrite.

The relationships of the minerals in this rock are the same as in specimen RH48 (previously described), with the exception of a lesser amount of magnetite in the sample discussed in this report. These relationships provide some implications regarding the genesis of the mineralisation at Mt. Victor.

The pyrite and magnetite appear to be genetically related and form the magmatic-segregation type lode described by Dow. The facts that the chalcopyrite was apparently introduced after the brecciation of the pyrite, and that it is commonly associated with talc suggest that although chalcopyrite is spatially related to the magnetite-pyrite lode, it may not be genetically related to these minerals. The possibility of a different source rock for the copper may have some significance on the further investigation of this prospect.

Report No.35:

TRACE ELEMENT ANALYSIS OF MAGNETIC MATERIAL FROM STREAMS IN PAPUA.

by

A. L. Mather

Following are results of analysis for trace elements in magnetic concentrates collected from streams in the Port Moresby - Kwikila coastal area of Papua. Magnetite is present as composite grains with ilmenite, quartz and silicate gangue. Before analysis, the material was upgraded by crushing in a ceramic mortar and the magnetic fraction collected with a hand magnet under water. An atomic absorption spectrophotometer was used to determine aqua regia-soluble Cu, Zn, Ni and Co in these samples. Samples were submitted by K. Yates.

Registered Number	Cu	Zn	Ni	Co	(in p.p.m.)
64070021	35	650	160	150	
25	37	600	150	145	
27	27	335	100	75	
39	37	585	145	135	
42	63	525	180	110	
44	35	535	135	120	
46	42	625	145	145	
49	25	475	130	110	
51	71	610	180	160	
54	35	575	160	110	
57	42	685	190	140	
60	33	525	145	150	
63	35	450	120	145	
66	42	415	120	120	
73	45	450	110	135	
74	44	500	130	145	
77	67	480	170	140	
79	26	415	135	135	
81	47	550	115	135	
64070083	37	480	145	150	

Registered Number	Cu	Zn	Ni	Co
64070084	30	400	95	130
87	41	500	145	150
92	60	575	145	145
95	142	675	115	175
98	87	525	140	150
111	70	435	170	165
115	33	540	130	125
117	36	450	165	135
119	42	575	160	130
121	40	620	160	145
123	71	470	140	165
125	130	420	215	200
127	64	435	120	145
129	89	440	190	175
133	75	440	200	160
136	81	525	140	130
139	86	610	145	115
141	117	400	155	105
145	53	360	160	165
150	30	290	90	85
152	58	370	140	140
157	58	330	170	115
159	60	380	170	190
160	36	490	110	145
161	90	420	195	175
163	126	345	200	165
165	67	440	160	155
167	85	440	205	165
169	58	460	170	120
171	25	325	110	110
176	90	520	270	155
178	50	440	135	160
180	75	475	170	180
182	50	400	150	150
64070185	37	430	130	140

Registered Number	Cu	Zn	Ni	Co
64070186	33	480	140	160
188	65	530	210	130
190	33	725	150	145
192	55	535	180	150
195	55	940	540	120
196	63	450	170	130
198	63	460	180	150
200	63	850	460	135
256	50	650	180	150
257	68	600	190	135
267	55	415	170	135
268	55	650	170	135
271	67	800	240	140
273	45	435	115	110
278	35	420	100	110
280	30	275	75	85
352	57	355	195	130
354	50	420	135	115
364	65	480	170	135
366	28	530	100	115
368	48	400	135	125
370	45	485	120	110
372	32	400	115	110
374	66	530	195	115
376	48	490	90	72
378	35	390	126	110
380	35	380	115	80
382	36	680	164	86
384	60	960	110	86
386	47	460	135	105
388	45	570	135	100
390	47	630	135	105
392	55	740	164	110
394	54	1140	135	86
64070396	53	770	115	75

Registered Number	Cu	Zn	Ni	Co
64070399	25	540	95	107
446	31	400	110	80
449	37	440	146	86
469	58	560	155	130
472	55	640	170	135
477	42	420	124	86
478	55	550	115	95
484	62	530	150	105
486	43	500	100	80
488	42	420	120	75
493	36	490	176	110
495	55	490	146	105
497	60	480	164	112
499	57	390	152	110
501	25	410	132	86
503	21	510	75	80
505	66	800	210	120
509	100	460	90	72
513	77	880	176	125
514	60	620	126	91
520	25	485	92	102
523	360	560	130	105
525	30	490	110	102
527	53	530	130	102
529	12	580	85	62
531	32	530	130	62
533	69	1100	126	90
540	36	370	105	85
542	70	455	160	110
544	76	365	170	145
602	22	380	85	102
604	53	720	110	81
608	10	410	70	80
64070611	51	495	98	90

Registered Number	Cu	Zn	Ni	Co
64070613	13	355	70	58
615	70	465	220	135
617	51	495	167	115
619	60	380	167	105
621	16	495	110	110
623	12	300	80	81
625	42	455	175	120
627	22	495	98	115
629	17	340	105	73
631	24	420	118	90
633	34	425	125	95
639	20	375	78	68
641	34	405	145	122
644	30	470	140	110
645	34	690	140	105
648	24	380	112	90
650	41	690	200	120
652	34	540	150	125
654	38	575	138	110
656	36	390	130	80
658	18	410	85	80
660	24	490	104	95
662	25	415	118	95
664	24	500	98	95
666	42	460	150	125
668	30	455	150	105
670	30	505	125	105
672	21	430	110	90
674	23	370	104	95
64070676	25	420	100	95

Day Book Entry No. 26th November, 1964.

REPORT NO.36

25/11/64

MOLONGLO RIVER EROSION CONTROL SEDIMENT SAMPLING
TOTAL SUSPENDED SOLIDS.

by A.D. Haldane.

The following results for total suspended solids were obtained on water samples taken from the Molonglo River, and its tributaries on the dates shown. The samples were submitted by R.Shaw, Department of Works in connection with investigations on erosion control and siltation in Lake Burley Griffin.

Sampling Site.	Sampled on 11/9/64.		Sampled on 12/9/64		Sampled on 6/10/64.	
	Time	T.S.S.ppm.	Time	T.S.S.ppm.	Time	T.S.S.ppm.
Doughboy Creek at Majura Road.	10.45 am.	2820	10.50 am.	41	3.00 pm.	21
Stonequarry Creek at Majura Rd.	10.50 am.	670	11.15 am.	22	3.05 pm.	990 ✱
Jerrabomberra Creek at Canberra Avenue,	12.35 pm.	4390	12.50 pm.	170	4.25 pm.	43
" at Letchworth Road.	3.00 pm.	1940	12.35 pm.	85	4.05 pm.	13
Reedy Creek at Sutton Road.	11.10 am.	1670	11.30 am.	31	3.30 pm.	10
Woolshed Creek at Majura Road	10.55 am.	3270	11.05 am.	77	3.10 pm.	33
" at Fairbairn Road bridge	12.05 pm.	250	11.40 am.	89	2.56 pm.	6
Woden Creek	11.40 am.	290	12.40 pm.	22	4.10 pm.	9
Black Mountain Creek	10.05 am.	610	9.50 am.	95	2.25 pm.	27
Sullivan's Creek at University Avenue.	10.50 am.	1830	10.15 am.	62	2.35 pm.	86
Molonglo River at Sutton Road bridge.	11.30 am.	160	11.40 am.	1120	3.43 pm.	9
" at Oak's Estate	12.05 pm.	230	12.15 pm.	150		
" at Duntroon bridge	12.25 pm.	12	10.30 am.	120		
" below Scrivener Dam			(9.40 am.	35	2.15 pm.	350
			(10.00 am.	12		
Queanbeyan River, below weir.	11.45 am.	260	11.50 am.	96	3.55	19

✱ Contained sand grains.

REPORT No.37. Nov.24th. 1964.

MINERAGRAPHIC EXAMINATION OF A MAGNETITE SAMPLE FROM S.W. OF MUD TANK, ALCOOTA. N.T.

by

I.R. Pontifex.

Sample submitted by D. Woolley.
Sample No. F53/14-14.
Locality. Four miles S.W. of Mud Tank, Alcoota N.T.,
adjacent to an apatite deposit.

Description of polished section.

The sectinn consists of about 45% of maghemite and about 10% of martite. These minerals have derived by the oxidation of magnetite, mainly along crystallographic planes. Scattered through the and martite are remnant patches of unaltered magnetite and these form about 30% of the section.

Irregular masses and bands of ilmenite in the magnetite make up about 10% of the section. The maximum width of the masses is about 4mm., of the bands it is about 2 mm. Fine exsolution blades of ilmenite are oriented along the octahedral planes of some magnetite and maghemite. These measure 0.02 mm. wide.

Some narrow cavities and fine fractures in the specimen are filled by limonite and psilomelane. These have a colloform texture in some veins.

REPORT NO.38.

A mineragraphic examination of four crypto-crystalline siliceous rocks from 5 miles north of Homestead, near Charters Towers, North Queensland.

by

I.R. Pontifex

Samples submitted by A.G.L. Paine for the identification of the Opaque minerals.

Field Number 17493:

A grey cryptocrystalline siliceous rock which contains narrow bands of pyrite. A black staining surrounds most of these bands.

Polished-section description:

Pyrite makes up about 95% of the opaque minerals in this section and hematite about 5%.

The pyrite generally occurs in subhedral grains which vary in size from sub-microscopic to 0.5 mm. The coarser grains are localised in bands and appear to be corroded on their edges.

Fine pyrite and skeletal crystals of hematite are dispersed at random through the rock.

Inclusions of a pink-brown anisotropic mineral in the pyrite has the appearance of pyrrhotite but the rare occurrence and small size of these inclusions rendered a positive identification impossible. Some pyrite carries inclusions of euhedral quartz.

The black staining around the pyrite bands impregnates the rock along intergranular boundaries. The precise composition of this staining was not evident from the polished-section study but it does appear to be a secondary alteration product derived from pyrite.

Field Number 17494:

A laminated rock which contains bands of white and pink finely crystalline quartz and bands of granular pyrite. The bands of pyrite are about 1 mm. wide; they have an irregular distribution, and they form about 10% of the rock.

Description of polished-section:

Of the opaque minerals present pyrite forms 85%, limonite 10%, and hematite 5%.

Pyrite occurs mainly as anhedral grains up to 0.5 mm. long and 0.15 mm. wide, commonly elongated parallel to the bands in which they are localised. Some grains are euhedral which indicates that they crystallised in adequate space to permit perfect crystal growth. These crystals have finely pitted peripheries which appear to be the result of primary corrosion.

The distribution of pyrite in bands, the euhedral form and apparent corrosion of some grains suggests that the pyrite is a bedded deposit of primary origin.

Accessory amounts of finely skeletal hematite occur through the rock. The hematite is extensively replaced by limonite which impregnates the rock along intergranular boundaries. This is responsible for the pink coloration in the rock.

Field Number 17495:

A crypto-crystalline siliceous rock which contains fine, irregular white and orange colored bands and also bands of granular pyrite.

Polished-section description:

The opaque minerals in this section consist of pyrite 65%, hematite 25% and limonite 10%.

The pyrite occurs as mainly as anhedral grains which have a highly irregular shape and these are condentrated in bands. Some pyrite grains in these bands have a corroded euhedral form. Rarely pyrite grains carry sub-rounded exsolution bodies of pyrrhotite.

Finely skeletal grains of hematite are present in some of the pyrite-rich bands. The hematite generally shows extensive oxidation to limonite which has disseminated through the rock to produce the orange-brown colored bands.

Field Number 17496:

A grey crypto-crystalline siliceous rock which contains grains of iron-oxide, localised in bands. The rock is stained by secondary iron-oxides.

Polished-section description:

The opaque minerals consist slmost entirely of magnetite grains which show various degrees of oxidation to hematite. The alteration takes place along the octahedral planes of the magnetite and around grain boundaries.

The magnetite and hematite give rise to secondary iron hydroxides; these stain the adjacent area and are responsible for the irregular brown patches and bands in the rock.

REPORT No.39.

ANALYSIS OF STREAM SEDIMENTS FROM ASTROLABE, PAPUA.

by

N.J. Marshall.

Following are the results for the determination of aqua regia soluble nickel, copper, cobalt and zinc in the non-magnetic fraction of minus eighty rock stream sediment samples submitted by K.Yates. All determinations were made by atomic absorption spectrophotometry.

Sample No.	p.p.m. Ni	p.p.m. Cu.	p.p.m. Co.	p.p.m. Zn.
070900	62	77	52	147
" 914	31	37	25	78
951	21	129	54	100
953	88	159	52	81
955	90	152	50	79
957	29	20	20	48
959	51	109	36	90
960	63	110	36	69
961	90	145	45	83
962	60	100	40	89
963	64	122	27	44
965	52	112	36	69
966	55	121	26	63
967	57	122	28	42
969	90	117	50	82
970	21	131	20	145
972	16	46	24	78
974	10	11	19	52
976	56	36	46	112
978	27	54	40	65
071020	52	100	24	103
012	9	17	20	57
015	41	90	30	62
016	34	112	21	60
018	44	100	28	69

Sample No.	p.p.m. Ni	p.p.m. Cu	p.p.m. Co	p.p.m. Zn
071022	190	25000	116	9350
023	61	23500	46	1650
024	65	178	13	120
025	48	143	26	78
026	74	240	41	115
027	32	125	46	63
028	60	126	24	99
038	33	12	24	58
051	17	45	49	58
052	61	4880	46	1650
054	33	103	33	86
056	31	109	49	64
057	33	139	28	101
059	36	79	30	78
061	60	4160	50	3100
063	41	138	25	118
065	46	182	28	70
067	33	79	32	101
069	30	37	42	101
070	36	68	30	90
072	53	86	28	78
075	67	130	32	101
076	33	50	26	38
078	11	35	31	56

Report No.40

TRACE ELEMENTS ANALYSIS OF BASIC ROCKS FROM ASTROLABE, PAPUA.

by

A.L. Mather

Following are analytical results for trace elements in 52 unweathered basic rocks collected in the Port Moresby - Kwikila coastal area of Papua. Copper, zinc, nickel and cobalt were determined in the aqua regia extract of the finely crushed rock. This extract would probably include any free sulphides, magnetite and most of the ilmenite of the rock. An atomic absorption spectrophometer was used for the determinations. The samples were submitted by K. Yates.

Registered Number	Cu	Zn	Ni	Co (in ppm.)
64070264	105	30	20	25
828	6	56	40	32
829	12	35	6	21
832	6	52	3	13
833	6	64	1	<5
835	8	35	3	10
837	84	58	15	21
839	22	75	8	21
841	137	45	28	25
865	221	55	28	27
867	10	68	7	32
869	20	66	7	32
873	208	56	25	32
901	6	46	3	21
902	138	82	10	25
905	68	84	15	21
907	70	46	10	21
910	123	50	12	21
912	147	56	20	32
913	201	82	25	32
915	178	82	8	32
916	41	22	12	16
918	149	66	23	27
919	152	56	15	21
921	159	85	22	16
922	103	90	19	21
64070924	123	61	38	30

Registered Number	Cu	Zn	Ni	Co (in ppm.)
64070926	135	71	28	30
928	12	40	4	21
930	88	104	15	40
932	164	66	36	30
934	118	55	30	30
936	180	58	37	30
938	180	87	15	30
940	12	42	9	21
942	8	41	2	21
944	170	61	13	25
946	69	96	10	38
948	78	80	13	47
1003	196	92	18	30
1004	170	40	18	16
1005	168	60	20	21
1006	118	94	21	32
1030	140	188	21	27
1032	180	75	26	27
1034	115	61	22	21
1036	60	15	15	10
1039	246	87	10	35
1040	389	36	13	11
1041	89	58	10	21
1042	18	25	16	11
64071043	147	80	15	32

Day Book Entry No. 1926 26th November, 1964.

REPORT NO. 41

ANALYSIS OF STREAM SEDIMENTS
ASTROLABE, PAPUA.

by

N.J. Marshall

Following are the results for the determination of aqua regia soluble copper, cobalt, nickel and zinc in the non-magnetic fraction of minus 80 mesh stream sediment samples submitted by K. Yates. All determinations were made by absorption spectrophotometry.

Sample No.	p.p.m. Cu	p.p.m. Co	p.p.m. Ni	p.p.m. Zn
070297	65	26	45	63
299	60	20	50	40
548	77	34	41	65
552	90	36	52	72
553	72	50	49	88
554	63	36	45	75
555	59	36	45	65
556	75	34	50	65
557	143	48	90	72
558	54	37	41	100
577	48	26	33	90
579	132	41	93	55
580	120	34	84	65
581	118	48	73	90
582	108	48	78	88
586	125	48	65	85
587	121	30	51	60
588	90	36	55	90
589	110	50	63	50
592	55	32	45	72
593	55	34	49	62
594	133	25	59	138
595	39	18	30	105
596	71	36	51	93
599	67	36	50	85
600	130	56	35	90
677	59	31	24	75
678	150	76	60	112
679	166	65	40	80
681	125	44	57	70
683	79	40	55	63
685	90	40	31	68
687	100	36	65	35
689	157	50	105	50

Sample No.	p.p.m. Cu	p.p.m. Co	p.p.m. Ni	p.p.m. Zn
070691	139	52	121	70
697	100	44	98	75
699	139	48	114	55
701	100	48	60	80
704	120	50	130	72
706	102	44	57	85
707	135	52	113	83
709	125	40	85	75
710	105	44	96	68
712	132	50	93	90
714	100	44	85	75
717	65	35	57	117
719	176	59	84	105
720	200	58	84	113

REPORT NO. 42

CITRATE-SOLUBLE COPPER IN STREAM SEDIMENTS FROM THE ASTROLABE AREA, T.P.N.G.

by

J.R. Beevers

The stream sediments, submitted by K.R. Yates, were the through 80 B.S.S. mesh fractions. The analyses represent copper that is extracted by cold 10% ammonium citrate.

Field Nos.	Cu (ppm)
070307	3.0
070308	<0.5
070693	1.0
070811	0.6
070812	1.0
070813	<0.5
070814	<0.5
070815	0.6
070816	1.6
070817	<0.5
070818	0.6
070819	<0.5
070820	<0.5
070821	<0.5
070824	0.6
070825	<0.5
070823	0.6
070843	<0.5
070845	1.0
070846	<0.5
070848	<0.5
070850	<0.5
071151	27.0
071172	1.6
071174	<0.5
071176	0.6
071177	<0.5
071179	3.0
071181	1.0
071183	1.6
071184	<0.5
071186	0.6
071188	<0.5
071190	<0.5

Field Nos.	Cu (ppm)	Field Nos.	Cu (ppm)
071191	<0.5	071271	<0.5
071193	1.0	071272 071273	<0.5 <0.5
071195	<0.5	071274	<0.5
071197	<0.5	071275	<0.5
071199	<0.5	071276	0.6
071201	<0.5	071277	<0.5
071203 071205	<0.5 <0.5	071278	<0.5
071207	<0.5	071279	0.6
071209	0.6	071281	<0.5
071211	0.6	071283	<0.5
071213	<0.5	071284	<0.5
071215	<0.5	071285	<0.5
071217	<0.5	071286	<0.5
071219	<0.5	071287	<0.5
071221	<0.5	071288	<0.5
071223	<0.5	071289	<0.5
071225	<0.5		
071226	1.0	071290	<0.5
071228	0.6	071292	<0.5
071230	<0.5	071293	<0.5
071232	0.6	071295	10.0
071234	0.6	071297	<0.5
071236	0.6	071298	1.0
071237	<0.5	071299	<0.5
071239	<0.5	071300	<0.5
071241	0.6	071305	0.6
071243	<0.5	071324	<0.5
071245	<0.5	071325	<0.5
071247	<0.5	071327	<0.5
071248	6.0	071329	<0.5
071250	<0.5	071331	<0.5
071252	<0.5	071333	2.0
071253	<0.5	071334	<0.5
071256	<0.5		
071257	<0.5	071336	<0.5
071259	<0.5	071337	<0.5
071261	<0.5	071338	<0.5
071263	<0.5	071339	<0.5
071264	<0.5	071340	<0.5
071266	0.6	071341	<0.5
071267	<0.5	071343	<0.5
071268	1.0	071344	<0.5
071269	<0.5	071346	<0.5

Field Nos.	Cu (ppm)	Field Nos.	Cu (ppm)
071348	<0.5	071415	<0.5
071349	<0.5	071416	<0.5
071351	<0.5	071417	<0.5
071352	<0.5	071418	<0.5
071253	1.0	071419	<0.5
071354	0.6	071420	<0.5
071356	<0.5	071421	<0.5
071358	1.0	071422	<0.5
071359	4.0	071424	<0.5
071360	3.0	071445	<0.5
071362	<0.5	071447	<0.5
071364	0.6	071449	<0.5
071365	1.0	071451	20.0
071367	<0.5	071453	<0.5
071369	<0.5	071454	1.6
071370	<0.5	071455	0.6
071371	<0.5	071456	<0.5
071372	<0.5	071458	<0.5
071374	<0.5	071459	1.0
071375	<0.5	071460	<0.5
071377	<0.5	071461	<0.5
071379	<0.5	071462	0.6
071381	<0.5	071463	0.6
071383	<0.5	071464	1.0
071385	<0,5	071465	1.6
071386	<0.5	071466	<0.5
071387	1.0	071467	<0.5
071388	<0.5	071469	0.6
071389	<0.5	071470	3.0
071391	0.6	071488	3.0
071392	<0.5	071489	2.0
071394	<0.5	071490	2.0
071396	<0.5	071491	2
071398	<0.5	071492	1
071400	<0.5	071393	1.6
071401	<0.5	071494	1
071403	<0.5	071495	0.6
071406	<0.5	071496	<0.5
071408	<0.5	071497	0.6
071410	<0.5	071498	2
071411	<0.5	071499	0.6
071412	<0.5	071501	216
071413	<0.5	071502	0.5
071414	<0.5	071503	1.0

Field Ncs.	Cu (ppm)	Field Nos.	Cu (ppm)
071505	0.6	071516	<0.5
071507	0.6	071519	<0.5
071508	1	071520	2
071510	<0.5		
071512	<0.5		

REPORT No. 43.

7th December, 1964.
File 120Q/15

MINERALOGICAL EXAMINATION OF HEAVY MINERAL SANDS FROM THE AYR AND BOWEN AREA, NORTH QUEENSLAND.

by

I.R. Pontifex.

The samples were submitted by A.G.L. Paine for quantitative analysis.

Field No. 14.8.61 Ar. (P).

Locality: Air photo: Ayr, run 8, No.5061. Dingo Beach,
15 miles N.W. of Bowen.

Mineralogy: A polished section and a thin section of a random sample of this sand (and each of the other sands) were examined. The percent of the minerals present were calculated from a grain count of each section.

This sand consists of the following mineral grains.

Opaque minerals:

ilmenite with exsolution intergrowths of hematite, rutile and magnetite	26%
titaniferous magnetite	23%
hematite containing exsolution intergrowths of ilmenite	10%
ilmenite	11%
ilmenite-magnetite (grains having the properties of both minerals)	9%
magnetite partly oxidised to hematite ..	8%

Non-opaque minerals:

zircon	6%
amphibole	3%
augite	2%
epidote	2%
rutile	1%
quartz	1%
plagioclase	1%

The average grain size is 0.15 mm. Generally the grains are angular and sub-angular; some of the opaque grains are well-rounded.

The intimate association of iron and titanium oxides is variable from grain to grain and it is difficult to determine the absolute abundance of grains containing specific mixtures of ~~three~~ these oxides. The figures given above regarding the opaque minerals therefore are accurate to within about 10%. It is apparent however, that all of these grains have a common source. The opaque minerals commonly form composite grains with amphibole. Zircon occurs as stumpy euhedral shaped crystals. The most common amphibole is hornblende. Two types of epidote are present; one has a pale green-yellow colour, the other has a deep sea-green colour.

Field No. 1.3.37 Ar. (P).

Locality. Air photo: Ayr, run 3, No. 5037.
Lyndis Beach, 10 miles N. of Ayr.

Mineralogy: This sand consists of the following mineral grains.

Opaque minerals:

ilmenite with exsolution intergrowths of hematite, rutile and titaniferous magnetite ..	18%
titaniferous magnetite	12%
ilmenite ..	10%

/2...

Non-opaque minerals:

quartz		19%
amphibole		10%
epidote		6%
plagioclase		6%
augite ~~orthoclase~~		4%
zircon		3%
rutile		2%
orthoclase		4%
volcanic groundmass fragments		2%
organic fragments		2%
biotite	approx.	1%
tourmaline	"	1%
garnet	"	1%

The average grain size is 0.15 mm. Generally the grains are angular and sub-angular. Many have well preserved, cleavage faces and crystal form.

The comments regarding the iron-titanium oxide minerals given for sample No.14.8.61, also apply to this specimen. In this sample however, minor-accessory amounts of chalcopyrite and pyrite are associated with some of the Fe - Ti oxide grains. These sulphides fill fractures in the oxides and they form masses up to 0.05 mm.

Hornblende is the dominant amphibole mineral. Two different types of epidote are present in about equal abundance. One has a light green - yellow colour, the other has a deep sea-green colour. The composition of several plagioclase grains (as determined by the extinction angle methods), proved to be in the oligoclase-andesine range. Most of the orthoclase grains are fresh, some however, are partly alteredto sericite.

The grains which appear to be derived from a volcanic groundmass are micro-crystalline; the dominant component~~s~~ is quartz, subordinate minerals are feldspar and sericite.

Field No. 4A.9.45 Ar.(P).

Locality: Air photo: Ayr, run 9, No.5045. Beach north of Flagstaff Hill, 1 mile N.E. of Bowen. North Queensland.

Mineralogy: This sand consists of the following mineral grains.

Opaque minerals:

ilmenite with exsolution intergrowths of hematite, rutile and titaniferous magnetite.		7%
titaniferous magnetite		7%
ilmenite		6%

Non-opaque minerals:

amphibole		25%
quartz		14%
plagioclase		10%
epidote		7%
orthoclase		5%
augite		4%
rutile		4%
organic fragments		4%
calcite		4%
zircon		2%
biotite		2%
chlorite		2%
hypersthene	approx.	1%
spinel	"	1%
apatite	"	1%

The grain size ranges between 0.05 mm and 0.3mm. The grains are angular and sub-angular.

/3....

The comments regarding the opaque minerals given for sample No. 14.8.61 also apply to this sample. The dominant amphibole is hornblende and some fragments of this mineral have small iron oxide inclusions oriented along crystallographic planes. The plagioclase is generally unaltered. The composition of the plagioclase (as determined by the extinction angle method) is variable. Most of the grains checked have an andesine - oligoclase composition; about 25% of them have a labradorite - andesine composition.

Two types of epidote are present. The most abundant is a light green - yellowish type, which usually occurs in anhedral shaped grains. The other has a deep green colour and this commonly has a broken prismatic form.

The identification of the hypersthene is not definite since the restricted occurrence of this mineral made a positive identification impossible.

7th December, 1964.
File 198A/1.

REPORT No.44.

PETROGRAPHIC DESCRIPTION OF A FINE-GRAINED MICACEOUS SANDSTONE FROM BEAVER LAKE, MACROBERTSON LAND, ANTARCTICA.

by

W. Oldershaw.

The handspecimen is a red fine-grained sandstone with scattered flakes of muscovite. There are a few wisps of dark red sandstone. The rock has a prominent set of fractures parallel to the wisps of dark sandstone and to the muscovite flakes.

Under the microscope the rock is seen to consist of small interlocking sub-angular to angular grains of quartz, plagioclase, microcline, hematite and flakes of muscovite with sparse interstitial calcite and limonite stained illite. The grains of quartz, flakes of muscovite and lenses of dark sandstone are markedly parallel. The dark coloured sandstone contains a higher proportion of hematite grains and limonite stains than the rest of the rock.

The grains of quartz are sub-angular to angular and range from 0.1 to 0.02 mm across. Most are of clear quartz, but a few consist of cloudy quartz, some contain trails of granules and some contain twisted ribbons of rutile. A few show strain shadows.

The grains of feldspar comprise about 5 percent of the rock and consist of fresh well twinned oligoclase and fresh microcline perthite.

Muscovite occurs as fresh slightly bent flakes, which are larger than the other mineral grains in the rock and range up to 0.2 mm. long. They are roughly parallel to each other and appear to cut through the other minerals. The muscovite may be of authigenic or low grade metamorphic origin.

Small rounded grains of tourmaline, epidote, apatite and zircon are scattered through the rock. Hematite occurs as irregularly shaped grains up to 0.1 mm. long.

The matrix between the grains comprises about 10 percent of the rock, and consists of calcite and limonite stained illite.

Many of the grains of quartz have interlocking diffuse boundaries and the muscovite flakes cut across them. This suggests that the rock has been recrystallized, probably by low grade metamorphism.

REPORT NO.45

198 NT/1
8th December, 1964.

A MINERALOGICAL EXAMINATION OF AN IRON-CARBONATE FROM S.W. OF MUD TANK, ALCOOTA, N.T.

by

I.R. Pontifex

Sample submitted by D. Woolley
Sample No. F53/14-15.
Locality. Four miles S.W. of Mud Tank, Alcoota, N.T., adjacent to an apatite deposit.

A thin section and a polished-section of this rock were examined.

The rock consists mainly of a coarsely crystalline aggregate of siderite. Secondary iron-hydroxides and minor hematite replace the siderite along rhombohedral cleavage planes and along intergranular boundaries.

Isolated, subhedral shaped crystals of apatite in the siderite matrix make up about 10% of the rock; these have a maximum diameter of 5 mm. The apatite is commonly cut by fracture-fill veins of carbonate and this suggests that the apatite crystallised prior to, or contemporaneously with, the formation its carbonate gangue.

Small, irregular patches of medium grained allotriomorphic aggregates of quartz fill cavities in the siderite and some quartz partly replaces rhombs of carbonate. The quartz appears to have crystallised contemporaneously with the carbonate.

The mode of origin of the siderite, apatite and quartz could not be definitely established from the study of this one specimen, although it is evident that these minerals did crystallise simultaneously. It seems most likely that the rock was formed by the metamorphism of a limestone and that during this process metasomatic activity was responsible for the introduction of iron, phosphate and halides.

/02

Report No. 46.

The Petrography of Alkali Feldspar - quartz Hornfelses from the Charters Towers Area, North Queensland

by

W.R. Morgan

The specimens were submitted by A.G.L. Paine for petrographic and mineragraphic examination. They were collected from a locality 4 miles north of Homestead, in the Charters Towers 1:250,000 Sheet area, Queensland. Their aerial photograph location is Charters Towers Run 3, Photograph 5097, Points 18 and 19. All four specimens are somewhat metasomatized alkali feldspar -quartz hornfelses. The specimens bear lenticular aggregates of pyrite and magnetite. I.R. Pontifex has described their mineragraphy in a separate report.

R. 17493

The hand specimen is a hard, pale creamish-grey, thinly banded rock; the bands are 1 to 2 mm. thick. Small amounts of sulphide minerals are present in some bands; the rock immediately around the sulphide has been stained dark grey. Some quartz veins are present- these cut the rock roughly parallel to the banding.

In thin section the rock is seen to be composed mostly of roughly equal quantities of granoblastic quartz grains and interstitial, untwinned alkali feldspar. These minerals occur in alternating finer and coarser-grained bands. In the more coarse bands, grainsizes range between 0.15 and 0.03 mm.; in the finer, grainsizes are 0.05 to 0.03 mm. No straining or microfracturing is present in these grains.

A few tabular crystals of microfractured albite are present; these range up to 0.75 mm. diameter. Their general appearance suggests that they are relic phenocrysts. The rock is cut by veins of coarse-grained quartz and alkali feldspar.

R. 17494

The hand specimen is a thinly banded, mottled pinkish-grey rock. A few of the bands are minutely cavernous, because of the weathering out of soft minerals.

In thin section, the rock is seen to be very similar in appearance to R.17493, except that no relic phenocrysts are present. The alkali feldspar is slightly to moderately sericitized in some places. A few small tabular crystals, now composed of chlorite, have a preferred orientation, and possibly represent pseudomorphed amphibole.

The rock is cut by somewhat irregular, sub-parallel veins that contain quartz, chlorite, sulphide minerals and epidote.

R. 17495

The hand specimen is a hard, somewhat mottled pink, yellow and grey, thinly banded rock in which small amounts of sulphide minerals occur along some of the bands.

In thin section, the rock has a fairly similar appearance to R. 17493, except that the alkali feldspar has been strongly altered to clay mineral in some layers. No relic phenocrysts were seen to be present.

103.

R. 17496

The hand specimen is a somewhat ferruginous, pale creamish-grey, fine-grained rock in which an indistinct banding is seen to be present. Small amounts of sulphide minerals present in some of thebands.

The general appearance of the specimen, in thin section, is rather similar to that of R. 17493. The quartzo-feldspathic groundmass is fine-grained and granoblastic, with grainsizes ranging between 0.03 and 0.1 mm. Elongated grains have a preferred orientation parallel to the banding; whether this is due to the metamorphism, or is a reflection of some pre-existing texture is not known. A few tabular crystals of albite are present; these range from 0.1 to 1.0 mm. in size, and probably represent relic phenocrysts.

Remarks

Two of the specimens (R. 17493 and R. 17496) contain plagioclase crystals whose form suggests that they are relic phenocrysts; the mineralogy of these specimens is roughly that of acid igneous rocks. The grainsizes in the groundmass are fine, suggesting that they are metamorphosed acid volcanic rocks. The other two specimens contain no relic phenocrysts; however, they have a fairly similar mineralogy to R. 17493/6, so that they could also represent metamorphosed acid volcanics.

The general textural appearance of all the specimens suggests that contact, not regional, metamorphism was responsible for the alteration.

Report No. 47 23rd December, 1964.

ANALYSIS OF STREAM SEDIMENTS

Astrolabe, Papua

by

N. J. Marshall & A. Chan

Following are the results for the determination of aqua regia soluble copper, cobalt, nickel and zinc in the non-magnetic fraction of minus 80 mesh stream sediment samples submitted by K. Yates. All determinations were made by atomic absorption spectrophotometry.

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64070 264	137	41	78	84
828	6	42	101	63
829	12	40	22	67
835	8	32	16	71
837	70	57	40	77
839	17	44	22	105
841	128	45	93	61
865	202	41	78	66
867	13	40	17	106
869	23	58	23	87
873	174	37	60	82
902	165	44	75	86
905	80	34	50	117
907	70	37	45	67
910	120	39	61	69
912	149	46	55	73
913	187	46	69	100
915	175	41	52	95
916	39	25	40	33
918	122	38	70	79
919	123	23	35	53
921	160	40	50	95
922	115	37	44	93
924	137	46	106	75
926	139	40	68	73
928	11	36	19	58
930	83	42	41	113
932	202	39	99	92

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64070 924	137	46	106	75
926	139	40	68	73
928	11	36	19	58
930	83	42	41	113
932	202	39	99	92
936	181	34	88	67
940	25	35	37	54
944	195	30	38	72
946	83	40	36	112
948	75	56	40	82
64071 003	191	40	49	95
005	191	37	56	80
030	141	37	51	124
032	197	40	59	89
034	113	34	53	63
036	49	17	30	19
039	252	50	54	97
040	367	23	40	51
041	85	30	29	68
64070 307	85	32	65	170
308	72	23	79	85
693	91	45	113	52
742	109	32	63	55
789	58	25	46	60
791	35	22	20	124
792	57	29	36	59
793	118	45	52	71
794	30	37	34	78
795	62	39	53	81
796	100	46	46	82
797	62	35	40	63
799	108	36	80	80
800	126	44	86	90
801	105	38	66	92
802	80	36	61	83
803	165	69	118	100
804	122	65	99	204
805	91	53	84	96
806	68	42	57	25
807	71	64	77	76

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64070 808	105	42	60	86
809	101	43	55	81
810	77	39	46	75
821	56	39	50	116
843	115	32	113	124
846	32	33	22	64
848	98	33	64	206
850	54	29	40	67
874	74	34	41	196
876	108	39	106	34
877	34	25	28	47
878	64	30	49	49
879	71	24	50	42
881	137	32	76	91
883	75	26	50	44
884	105	33	58	49
886	113	39	83	55
888	53	20	48	105
889	158	80	262	192
890	150	60	124	177
892	135	48	62	173
64071 174	168	29	55	146
176	135	34	82	115
177	140	38	83	68
181	109	33	77	72
183	110	35	93	207
184	185	42	67	80
186	188	46	66	81
188	132	46	83	114
64070 560	54	36	35	82
561	34	14	23	66
562	43	26	30	74
563	59	38	41	81
564	72	32	50	80
565	74	42	51	87
566	66	40	50	77
567	60	35	44	90
568	271	57	88	144
569	73	42	49	85

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64070 570	114	49	80	54
572	76	54	53	55
573	105	65	81	60
574	71	86	50	62
575	66	33	46	60
576	74	32	29	97
64070 894	69	39	68	90
896	106	47	53	55
898	66	37	72	82
64071 172	123	32	57	97
179	174	39	62	94
191	131	40	62	69
193	62	30	31	71
195	113	29	37	69
197	158	36	61	65
199	80	30	56	76
64071 201	83	26	41	40
203	70	31	40	55
205	82	30	37	78
207	51	15	24	21
209	100	29	41	34
211	97	20	60	34
213	49	25	45	44
215	55	32	39	55
217	189	23	43	104
219	88	26	42	55
221	109	27	37	45
223	90	26	15	41
225	78	41	62	116
226	59	20	47	22
228	93	30	71	51
230	82	62	61	68
232	86	39	72	58
234	147	25	50	88
237	11	12	6	24
239	19	15	14	31
241	88	30	48	75
243	78	20	30	72
245	117	35	50	68

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64070 716	48	36	34	175
721	195	86	75	87
723	80	60	55	93
724	17	50	12	81
725	92	50	100	50
726	120	52	80	65
728	95	80	60	150
729	117	60	75	104
731	144	50	80	150
732	65	50	45	93
734	195	86	70	115
736	42	40	18	45
738	95	35	44	87
740	58	30	31	50
744	36	30	18	57
747	83	62	50	100
748	68	70	44	105
749	35	70	51	109
751	83	63	49	72
752	87	54	49	65
753	132	74	70	78
754	78	43	70	44
755	126	52	60	80
756	117	60	60	65
757	114	45	53	82
758	106	52	53	60
760	124	83	45	69
762	119	80	44	79
763	165	65	88	50
764	75	44	28	53
765	90	44	60	105
766	112	52	56	83
767	100	50	51	100
768	78	55	48	90
770	55	62	37	118
772	51	52	42	93
773	47	50	35	87
774	53	43	30	79
776	57	52	39	107
777	112	51	56	85

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64070 778	90	52	58	84
779	92	51	49	76
781	78	45	44	103
783	99	52	60	87
784	102	44	42	77
785	95	52	53	83
786	73	60	50	92
787	68	92	56	66
788	55	70	49	61
64071 082	28	39	10	63
084	34	31	15	81
086	29	30	11	70
088	21	34	9	46
090	61	27	43	66
092	42	35	30	58
094	120	36	71	56
096	72	20	47	16
098	90	27	43	25
100	75	32	49	59
102	21	73	10	66
103	96	79	82	216
104	151	48	106	48
105	44	25	14	85
107	111	26	61	47
109	112	31	59	41
110	78	20	51	24
112	89	36	68	35
114	46	22	16	25
116	85	40	64	52
117	61	36	51	49
118	57	32	55	52
120	71	29	49	42
122	95	28	26	78
124	125	29	42	101
126	50	31	21	80
128	70	26	41	87
129	19	23	7	44
131	12	20	9	63
132	43	24	16	80
134	21	29	20	59

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64071 136	25	25	10	57
138	38	22	21	66
140	99	31	47	77
142	38	28	20	82
144	99	36	31	100
146	79	30	36	59
148	113	30	50	70
150	40	26	45	75
152	132	32	65	91
53	144	25	66	96
155	25	22	16	46
156	66	30	47	90
158	112	30	57	79
160	98	31	56	102
162	30	24	17	70
164	22	23	14	48
166	43	24	40	85
168	70	30	40	89
170	100	19	36	81
080	20	29	10	42
248	798	35	82	134
250	132	22	41	83
252	174	22	60	26
253	40	36	52	30
257	126	35	72	103
259	89	45	68	72
261	97	29	30	94
264	220	30	53	134
269	215	25	61	114
271	202	28	55	102
279	112	34	61	56
281	82	29	48	53
283	86	20	48	89
284	62	19	42	62
285	52	18	38	50
286	82	18	49	73
287	49	13	55	47
290		24	78	140
293	180	29	61	102
297	131	36	68	57

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64071 300	67	31	93	79
324	214	44	65	126
325	80	26	38	83
327	37	22	21	51
329	68	22	60	78
331	26	19	16	64
333	159	40	105	130
334	77	20	32	75
336	264	31	82	196
337	335	26	69	316
339	137	27	89	118
340	360	26	85	200
341	104	38	44	46
344	39	38	16	36
346	95	40	20	31
349	113	32	51	74
352	119	32	52	80
353	204	45	69	77
354	84	32	46	44
356	66	35	36	58
360	132	50	80	76
362	119	43	74	75
365	116	35	64	70
367	117	40	49	69
372	170	44	72	110
375	131	42	40	75
377	48	24	17	49
379	222	35	80	104
381	168	45	80	118
383	129	40	70	93
389	128	29	56	107
392	121	29	54	97
394	104	25	41	85
396	111	30	53	94
398	94	30	55	107
400	365	36	46	237
401	36	29	30	30
403	36	31	40	36
406	173	31	58	104
408	40	41	51	49

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64071 412	160	30	88	106
424	105	37	61	53
447	135	29	56	85
449	92	36	63	79
451	688	41	73	186
456	90	21	62	229
467	70	48	46	71
503	74	37	46	89
505	44	21	28	54
508	73	26	32	71
510	122	27	48	115
512	85	21	38	92
514	152	30	45	86
516	162	34	62	145
519	96	34	49	62
64070 811	76	27	20	92
812	82	34	34	102
813	50	28	27	73
814	45	21	24	62
815	38	25	21	68
816	70	60	26	57
817	69	40	43	98
818	89	35	53	96
819	85	41	51	100
64071 410	135	23	52	111
411	108	26	49	63
413	95	21	50	84
414	40	11	18	36
415	128	26	57	77
416	91	25	57	93
417	47	12	17	40
418	100	47	142	80
419	138	27	52	81
453	158	33	70	106
454	139	31	69	111
455	99	33	51	64
458	138	29	71	99
459	100	23	62	96
460	116	38	69	78
461	118	33	70	123

Sample No.	ppm Cu	ppm Co	ppm Ni	ppm Zn
64071 462	140	51	117	111
463	122	41	69	67
464	147	44	98	102
465	87	23	59	36
466	55	39	42	53
469	250	36	63	115
470	118	44	76	63
488	118	44	82	55
489	112	25	87	81
490	86	38	81	66
491	113	37	76	76
492	147	33	74	68
493	140	39	91	49
494	65	20	47	48
495	135	47	60	105
496	199	46	91	85
497	91	39	65	75
498	38	29	36	90
499	1350	55	79	406
501	142	35	47	152
502	114	26	47	104
507	109	39	69	82
520	112	29	74	96

198NT/1

Report No. 48

MOLONGLO RIVER EROSION CONTROL SEDIMENT SAMPLING

by

A. D. Haldane

The following results for total suspended solids were obtained on water samples taken from the Molonglo River and its tributaries on the dates shown. The samples were submitted by R. Shaw, Department of Works, Canberra.

Total Suspended Solids in p.p.m.

Locality	30.10.64	18.11.64	9.12.64
Below Scrivener Dam	38	15	20
Black Mountain Creek	250	12	Nil
Sullivan's Creek, University Avenue	320	13	24
Woolshed Creek, Fairbairn Avenue	120	6	5
Doughboy Creek, Majura Road	1280	9	
Stone Quarry Creek, Majura Road	980	4	5
Woolshed Creek, Majura Road	2220	24	20
Reedy Creek, Sutton Road	2980	Nil	Nil
Molonglo River, Sutton Road	220		2
Queanbeyan River, Queanbeyan	270		2
Jerrabomberra Creek, Canberra Avenue	340		5
Jerrabomberra Creek, Letchworth Road	64		Nil
Woden Creek, Jerrabomberra Avenue	110	9	13
Molonglo River, Duntroon Bridge			9
Molonglo River, Oaks Estate			4

Serial Nos. 1937, 1963.