COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1966/121

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

JANUARY - JUNE 1966.

Compiled by

E. Woodhead.

5928/65

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JANUARY - DECEMBER 1966.

Compiled by

E. Woodhead.

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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 1966 to December 1966, the record is divided into two parts; the first deals with reports covering the period January to June 1966. The second part deals with reports covering the period July to December 1966. In each part the reports are in chronological order.

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

PART ONE

JANUARY - JUNE 1966.

Compiled by

E. Woodhead.

RECORDS 1966/121.

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TITLE

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Laboratory Report No. 1 13/1/66

Examination of sulphide ores from the Mt. Lyell area Tasmania

by

I.R. Pontifex

Five sulphide specimens were submitted by N.W. Le Roux which were received from the Mt. Lyell Mining Company. These form some of the material being used by Le Roux in sulphide leaching experiments and the following examinations were made to determine the mineral impurities in each sample.

Following is a list of the specimens examined and the mineral impurities found in them.

T1. Chalcopyrite. W. Lyell Open Cut.

impurities : silicate grains, ? sphalerite.

T2. Pyrite. Iron Blow

impurities : silicate grains, ? cassiterite

T3. Bornite. Crown Lyell

impurities : pyrite, chalcocite, digenite, silicate grains, "orange bornite", chalcopyrite.

T4. Pyrrhotite. Renison Bell.

impurities : chalcopyrite, silicate grains, ? tetrahedrite, ? cassiterite.

T5. Chalcopyrite. Crown Lyell

impurities : silicate grains, bornite, tetrahedrite, chalcocite, digenite.

T1. Chalcopyrite. W. Lyell Open Cut.

Inclusions form far less than 0.5% of the section; these include:

a) 12 - 15 silicate grains which measure up to 15 microns x 5 microns.

b) 2 grains of possible ? sphalerite; these measure 5 microns x 5 microns.

T2. Pyrite. Iron Blow.

Small silicate grains make up 2-3% of the section of pyrite examined.

Several grey grains which generally measure 0.03 mm. across occur in voids, with quartz in the pyrite host; these form less than 0.5% of the section. They are strongly anisotropic and have a darker grey color in oil than in air. Several grains have a whitish internal reflection in oil.

Although a positive identification could not be made these are most likely cassiterite.

T3. Bornite. Crown Lyell Mine.

This section consists predominantly of bornite (60% of the section) and this contains abundant euhedral and subhedral grains of pyrite which forms about 15% of the section. The size of pyrite grains varies from 0.001 mm. to 0.8 mm. across. Some of the bornite, particularly around grain margins and along fractures, has been altered to chalcocite and digenite; together these make up 5-7% of the section.

Silicate grains and masses of irregular size and shape have a random distribution through the section. These comprise 20-25% of the section.

Several grains of "orange bornite", named mawsonite ($Cu, Fe_2 Sn S_{10}$) by Lawrence & Markham, were recognised in the bornite. Several extremely small grains of chalcopyrite also occur in the bornite.

T4. Pyrrhotite. Renison Bell

The impurities in this section are chalcopyrite, silicate grains, ? tetrahedrite ? cassiterite.

a) Chalcopyrite forms 1-2% of the section; it is scattered through the pyrrhotite host in discrete patches which have a maximum dimension of 0.25 mm. x 0.15 mm.

b) Silicate grains make up 5-7% of the section, some of these measure up to 2 mm. across. Thin stringers of quartz also cut through the pyrrhotite. Some silicate grains are fibrous which are indicative of an asbestos type mineral.

c) Several extremely fine grains of probable tetrahedrite occur in the pyrrhotite.

d) Several extremely fine grains of possible cassiterite are localised in voids within the pyrrhotite. The small size of these grains prevented a positive identification.

T5. Chalcopyrite. Crown Lyell.

Inclusions form about 25% of the section; these include:

a) Silicate grains which measure up to 0.5mm. across. (One grain, containing minor bornite measures 1.2mm. across). These make up about 12% of the section.

b) Bornite, in discrete grains and skeletal masses have a maximum dimension of 1.2 mm.; these have a patchy and irregular distribution through the chalcopyrite host. The bornite forms about 10% of the section.

c) Several olive grey, rather rounded inclusions, generally associated with the bornite are most likely tetrahedrite but their small size (0.05mm.) prevented a positive identification. These form less than 0.5% of the section.

d) The margins of some bornite masses and grains are replaced by minor amounts of digenite and chalcocite.

Laboratory Report No. 2.

17th January, 1966

Spectrochemical Analysis of Rock Samples from the Davenport Range, N.T.

by

A.D. HALDANE

The following results were obtained for the semi-qualitative spectrochemical analysis of 123 rock samples from the Davenport Ranges submitted by I. Pontifex as part of an investigation of a reported occurrence of copper in the Davenport Ranges.

All results are expressed in parts per million.

Sample No.	Ni	Co	Cu	V	Pb	Other Elements
1	30	30	5	200	5-	
2	25	30	50	150	5	
3	30	20	70	150	5-	
4	30	40	70	200	20	
5	20	20	200	100	20	
6	60	40	150	150	5	
7	10	7	150	100	20	
8	20	30	20	150	20	
9	25	20	10	100	5-	
10	15	15	100	100	20	
11	25	25	40	150	15	
12	15	15	40	150	15	
13	25	25	15	200	7	
14	15	30	50	200	70	
15	50	5	2	80	15	
16	15	40	70	300	15	
17	25	15	2-	150	10	
18A	35	12	50	100	10	
18B	40	20	5	150	40	
19	20	30	10	150	15	
20	40	15	2-	10	5-	
21	12	30	70	150	20	
22	20	30	7	200	15	
23	30	20	10	150	5-	
24	25	35	80	300	10	
25	25	35	50	200	100	

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Sample No.	Ni	Co	Cu	V	Pb	Other Elements
26	30	30	1500	200	5	
27	25	10	10	30	10	Mo(2)
28	20	5	5	50	10	Mo(7)
29	25	25	40	100	20	
30	30	30	15	200	20	
31	50	10	2	150	100	
32	50	40	30	200	20	
33	25	30	1000	200	50	
34	30	7	40	100	50	
35	40	20	700	200	200	
36	10	15	15	60	20	
37	30	30	70	200	50	
38	20	12	20	100	100	
39	30	20	10	100	20	
40	15	10	200	300	70	
41	40	25	400	200	100	
42	25	30	15	150	20	
43	60	12	10	200	700	
44	20	20	500	150	2000	Mo(15)
45	7	5	80	60	20	
46	15	30	80	200	10	
47	15	20	30	150	10	
48	12	15	2-	60	5-	
49	30	30	40	100	5-	
50	10	20	30	100	10	
51	7	30	30	150	10	
52	5	20	70	100	100	
53	10	15	35	100	5	
54	25	20	10	100	5	
55	12	30	40	150	20	
56	5-	20	2	100	5-	
57	5-	5	2-	100	15	
58	10	25	30	100	5-	
59	30	15	70	30	500	
60	5	15	30	100	5-	
61	15	20	10	100	5-	
62	5	20	100	150	5-	
63	15	20	2-	100	5-	
64	10	20	7	100	5-	
65	10	25	5	150	5	
66	15	15	40	60	20	

Sample No.	Ni	Co	Cu	V	Pb	Other Elements
67	10	25	40	150	1000	Zn(700)
68	12	30	70	200	2000	Zn(300)
69	5	20	15	100	5	
70	12	20	10	100	5-	
71	10	12	700	200	10	
72	10	20	500	200	100	
73	12	20	5	100	20	
74	10	20	15	100	10	
75	12	30	40	150	5	
76	30	20	7	30	10	
77	25	10	15	60	5	
78	10	30	500	150	5	
79	30	7	2	5	10	
80	5	5	150	100	20	
81	20	30	70	150	100	
82	20	30	15	100	5	
83	5	15	50	100	10	
84	30	30	2-	200	5	
85	20	30	50	150	5	
86	15	15	5	150	10	
87	30	30	50	150	5	
88	7	12	15	100	10	
89	15	12	2	100	50	
90	5-	5-	2-	20	5-	
91	10	20	15	60	5-	
92	15	20	500	60	5-	
93	5	5-	2	100	10	
94	20	20	5	150	10	
95	15	20	70	150	5	
96	12	15	70	100	10	
97	15	25	10	150	5	
98	5-	15	50	150	5	
99	25	30	30	200	5-	
100	7	30	700	200	5-	
101	15	30	400	300	10	
102	50	30	15	150	5-	
103	15	30	20	200	5-	
104	15	15	4000	100	20	
105	10	30	50	100	5	
106	5	10	7	100	5	
107	10	7	50	150	5-	

Sample No.	Ni	Co	Cu	V	Pb	Other Elements
108	7	15	70	60	70	
109	15	12	15	100	10	
110	10	15	40	100	20	
111	40	15	20	100	400	
112	10	20	40	200	5	
113	20	30	40	300	10	
114	12	25	15	150	5-	
115	12	12	2-	80	5-	Sn (50)
116	30	15	2-	100	10	
117	30	10	10	40	70	
118	5	20	40	100	10	
119	10	15	100	150	100	
120	20	12	50	40	5-	
121	10	30	40	100	5-	
122	12	5-	2-	20	5	

5 - less than 5 P.P.M.
Plate Nos. 890-894.

Lab. Report No.3 17. 1. 66

COMPARATIVE ANALYSES OF IRONSTONE SAMPLES FROM NORTHERN STAR, TENNANT CK.

by A. D. Haldane.

This report shows a comparison of the results obtained for Cu Co and Pb as determined by atomic absorption spectrophotometry (A.A.S) and the normal semi quantitative spectrochemical procedures. The solutions for atomic absorption analysis were prepared by digesting the samples with aqua regia. As these were ironstone the residues consisted mainly of silica and titanium compounds which were shown by spectrographic analysis to contain only negligible traces of Cu and no Co or Pb. So that the acid digestion can be considered to have extracted all the trace metals and the A.A.S. values are directly comparable with the total values obtained by the spectrochemical procedure.

All samples were from waggon drilling at Northern Star, Tennant Creek and were submitted by D. Dunnet.

A.A.S. values for Zn are also included. No spectrochemical results for Zn are available because of interference of Fe and Ti and the low Zn level.

All results are expressed in part per million.

Field No.	Grid.Coord.	Depth	Zn AAS.	Cu AAS.	Cu SPEC.	Co AAS.	Co SPEC.	Pb AAS.	Pb SPEC.
050130	380^S 140^E	57-60	60	240	200	40	40	20-	10-
050076	340^S 140^E	48-51	180	1100	1500	50	40	20-	10-
050289	340^S 300^E	3-6	40	280	200	60	40	40	10-
292		12-15	20	220	200	50	30	20-	10-
293		15-18	40	350	300	50	40	40	10-
294		18-21	40	240	200	45	40	30	10-
295		21-24	45	270	200	55	40	30	10-
296		24-27	45	280	200	65	70	20-	10-
297		27-30	60	550	500	100	70	20-	10-
298		30-33	75	600	500	110	70	20-	10-
312		36-39	50	430	500	65	50	20-	10-
313		39-42	50	920	800	160	150	100	10-
314		42-45	65	1000	1500	160	150	90	50
315		45-48	70	1300	1000	240	200	20-	10-
316		48-51	90	1100	1000	200	150	30	30
317		51-54	150	860	800	170	150	110	70
318		54-57	160	1100	1000	90	50	160	100
321		57-60	300	1400	1000	210	200	280	300
322		60-63	300	1400	1000	220	150	210	300
323		63-66	240	1600	1000	220	150	150	100

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Field No.	Grid.Coord.	Depth	Zn AAS.	Cu AAS.	Cu SPEC.	Co AAS.	Co SPEC.	Pb AAS.	Pb SPEC.
080186	420^S 20^W	54-57	25	880	1000	60	70	20-	10-
187		57-60	55	1100	1500	70	80	20-	10-
188		60-63	20	2900	3000	180	100	20-	10-
189		63-66	95	3200	3000	230	150	20-	10-
190		66-69	40	1400	1500	80	70	20-	10-
191		69-72	30	700	1000	50	50	20-	10-
192		72-75	25	380	500	30	40	20-	10-
193		75-78	35	410	500	50	70	20-	10-
194		78-81	40	400	300	40	40	20-	10-
195		81-84	25	320	300	35	30	20-	10-
196		84-87	20	250	500	25	40	20-	10-
198		90-93	40	440	300	70	40	20-	10-
199		93-96	45	320	300	50	50	20-	10-
200		96-99	65	480	300	65	70	20-	10-
050201	420^S 300^E	0-3	50	1600	1500	290	300	20-	10-
202		3-6	50	1500	1000	230	150	20-	10-
203		6-9	50	1500	1500	270	200	20-	10-
204		9-12	50	1100	500	260	150	20-	10-
205		12-15	30	680	700	170	150	20-	10
206		15-18	35	1100	700	310	200	20-	10-
207		18-21	50	1500	1000	370	300	20-	10-
208		21-24	30	770	500	170	80	20-	10-
265		57-60	100	4000	5000	350	300	20-	10-
267		63-66	90	2400	3000	280	300	20-	10-
268		66-69	80	1100	2000	160	200	20-	10
269		69-72	100	2500	2000	320	300	30	10-
278		78-81	110	2500	1500	280	100	20-	10-
279		81-84	200	4500	3000	400	150	20-	10-
050280		84-87	190	3900	2000	330	300	20-	10-

- = Less than.
A.A.S. = Atomic Absorption Spectroscopy.
SPEC. = Optical Emission Spectrograph.

Plate nos. - 834,835

Laboratory Report No.4. File 65/6280

17th January, 1965

A MINERALOGICAL AND X-RAY ANALYSIS OF A SUSPECTED PHOSPHATE-RICH ROCK FROM NEAR DARWIN. N.T.

by

I.R. Pontifex and J.M. Rhodes

The sample was submitted by L.C. Noakes.
Locality, Gunn Point, approximately 20 miles E.N.E. of Darwin N.T.

Description of thin section.

About 90% of this rock consists of an aggregate of pale-brown grains which have an average size of 0.075 mm. Intersticies within this aggregate are partly filled with clay and silt-size quartz.

Some of the brown grains have a spherulitic structure; some are concentrically zoned; others have a sub-radiating form. They have an extreme birefringence and a uniaxial, negative interference figure with numerous rings. Their R.I is greater than 1.7.

The grains effervesce vigorously in warm 1:1 JCl.

These properties suggest that the mineral is siderite. Some of these properties are also characteristic of other carbonate minerals and dahllite; however the high R.I is exclusive to siderite.

X-ray diffraction powder photograph

The X-ray diffraction pattern of a crushed sample of this rock indicates that it consists almost entirely of a carbonate mineral - most likely siderite.

There is no suggestion that the rock contains dahllite and although dahllite is a carbonate-apatite it is the opinion of several authors cited in Deer, Howie and Zussman (1964) that"the X-ray pattern of carbonate apatites show no evidence of the presence of crystalline carbonates".

Spectrographic analysis

The sample was analysed on the automatic X-ray fluorescent spectrograph and the following results and comments were produced by Rhodes.

		%
SiO_2	-	13.46
TiO_2	-	0.18
Al_2O_3	-	3.49
Fe_2O_3	-	50.63
CaO	-	1.35
K_2O	-	0.38
P_2O_5	-	0.05
loss (10000°C)		29.01
Total		98.55

From the analysis it appears that most of the sample was the iron carbonate, siderite. If this is the case the Fe would be present in the ferrous state, and would therefore be less than given above. To compensate for this loss which would be due to CO_2 should be larger, since oxidation of iron during heating will cause the sample to gain weight.

Recalculation of the analysis to allow for the ferrous nature of the iron gives the following results:-

		%
SiO_2	-	13.46
TiO_2	-	0.18
Al_2O_3	-	3.49
Fe_2O_3	-	-
FeO	-	45.57
CaO	-	1.35
K_2O	-	0.38
P_2O_5	-	0.05
loss (10000°C) (= CO_2)		34.12
Total		98.60

Conclusion.

The evidence indicates that this rock consists almost entirely of siderite and that it is derived from a sedimentary siderite deposit.

Laboratory Report No.5 File 65/6608

SPECTROCHEMICAL ANALYSIS OF GEOCHEMICAL SAMPLES FROM AYR, QUEENSLAND.

by

A.D. Haldane

Following are the results of semi-quantitative spectrochemical analysis of 59 soil and 86 rock samples collected from the Ayr 1:250,000 Sheet area as part of the Bowen Basin Geochemical Survey.

The samples were submitted by N.J. Marshall. Gold, bismuth, antimony, zinc, arsenic, tungsten, niobium and tantalum were sought but not detected in any sample. All results are expressed in parts per million.

Soil Samples

Sample No.	Ni	Co	Cu	Pb	Mo	V	Other elements
65150037	50	40	25	5		50	
040	30	40	50	5		120	Be(2)
061	a	a	2	10		20	
062	a	a	2	5		6	
063	a	a	2	5		30	
091	a	6	4	10		120	
092	a	3	4	10		60	Sn(5)
101	5	a	4	5		50	
102	a	a	4	5		30	
104	a	a	2	20		2	
105	a	a	2	15		6	
107	a	a	2	15		2	
108	1	3	4	20		12	
110	a	a	2	15		1	
111	a	a	2	15		1	
112	a	a	4	15	2	2	
113	a	a	4	10	10	12	
127	a	3	15	15		60	
128	a	7	10	20		80	
130	a	5	25	60		120	
131	a	7	20	100		120	
133	a	a	2	5		30	
134	a	a	2	5		60	
136	a	3	2	5		60	
137	5	2	4	30		120	
139	5	2	6	40		80	
141	80	60	30	10		250	
159	a	a	2	10		4	
162	a	a	6	20		6	
188	a	a	2	10		10	
190	a	a	4	20	10	40	
195	a	6	4	10		120	
196	a	2	2	10		100	
202	35	20	25	10		150	
199	10	10	25	10		150	

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Sample No.	Ni	Co	Cu	Pb	Mo	V	Other Elements
65150204	5	10	10	10		120	
206	15	15	15	10		150	
208	10	15	15	10		150	
210	20	12	15	10		200	
215	a	4	15	10		60	
217	5	10	20	10		150	
219	a	6	20	10		200	
221	5	10	15	10		120	
222	5	10	15	10		120	
224	5	10	10	10		120	
225	5	10	15	10		150	
228	5	12	20	10		120	
230	5	10	10	10		120	
233	20	15	20	10		150	
234	30	15	25	10		200	
236	20	15	30	10		150	
238	40	20	25	10		250	
240	20	10	20	10		120	
242	6	2	10	10		50	
244	2	2	10	20		50	
246	2	a	4	20		40	
248	4	a	5	20		50	
250	10	6	15	20		80	
252	6	6	5	20		80	

Rock Samples.

Sample No.	Ni	Co	Cu	Pb	Mo	V	Other Elements
65150003	10	1	2-	10		30	
4	20	a	2	15		5	
12	15	1	2-	10		20	
15	8	1	2	10-		20	
23	10	a	2-	15		a	
24	25	15	30	10-		200	
29	30	20	15	10-		250	

Sample No.	Ni	Co	Cu	Pb	Mo	V	Other Elements
65150036	40	30	10	10–		100	
41	40	20	20	10–		200	
49	30	15	20	10–		200	
56	10	a	2–	15		10	
65	8	10	20	10–		100	
66	10	a	2–	20		1	
75	20	2–	2	130	3	1	
89	25	2–	3	30	3	2	
90	20	2–	2–	30	2	7	
103	60	2–	20	100	3	3	
106	40	2–	15	100	4	3	
109	60	2–	20	100	10	7	
114	30	2–	15	60	700	80	Sn(10)
115	60	2–	15	130	7	2	
116	40	2–	20	100	700	60	Sn(10)
117	40	2–	20	130	20	1	
118	100	25	40	10	5	300	
119	80	2	35	1000	5	20	Ag(2)
120	3	2–	2–	600	2	25	
121	80	2–	30	30	3	20	
123	40	2–	15	30	2	15	
126	20	2–	3	30	2–	20	
129	20	2–	3	30	2–	25	
132	20	2–	2	20	2–	1	
135	20	2–	2–	20	2–	1	
138	12	3	6	20	2–	80	
140	150	25	15	10–	2–	100	
142	20	2–	2–	20	2–	3	
146	15	2–	2–	20	4	20	
147	20	2–	2	10	2–	15	
150	15	2–	3	20	3	20	
154	15	25	10	15	1000+	10	
156	20	2–	2–	20	6	15	
158	20	2–	10	30	2–	15	
160	15	2–	3	20	2	3	

15

Sample No.	Ni	Co	Cu	Pb	Mo	V	Other Elements
65150161	20	2-	10	20	2-	2-	Sn(10)
163	25	2-	2-	20	2	10	Sn(7)
165	20	2-	2-	15	2	10	
166	15	2-	2-	10	2-	10	
168	15	2-	2-	20	3	15	
173	15	2-	2-	10	2	15	
177	20	2-	2-	10-	2	10	
182	20	2-	2-	10-	4	10	
184	15	2-	2-	10	3	10	
189	20	2-	2-	15	6	2	
191	20	2-	2-	10	15	3	
192	20	2-	2-	10	4	4	
193	25	2-	4	10	2-	6	
194	25	2	6	10-	30	40	
197	30	12	20	10-	2-	250	
198	30	10	40	10-	2-	250	
201	30	10	40	10-	2-	200	
203	10	2-	3	10-	2-	30	
205	25	10	20	10-	2-	200	
207	130	30	30	10-	2-	500	
209	80	20	60	15	2-	300	
211	60	10	80	10	3	200	
212	80	15	30	10	2-	300	
213	30	10	20	20	2	200	
216	40	10	60	20	4	300	
218	80	8	60	20	4	250	
220	60	10	40	20	3	300	
223	80	15	60	20	3	300	
227	80	15	40	10	3	300	
229	80	4	35	10	3	100	
231	60	10	40	10	3	200	
232	60	15	15	30	2-	400	
235	30	10	30	20	2	200	
237	20	10	40	10-	2-	300	
214	25	2-	10	30	2-	35	

Sample No.	Ni	Co	Cu	Pb	Mo	V	Other Elements.
65150239	20	2-	3	15	2-	30	
241	25	4	6	10	2-	100	
243	25	3	3	20	2-	60	
245	10	2-	2	20	3	25	
247	10	2-	2	20	2-	25	
249	30	12	40	20	2	200	
251	10	2-	2-	20	2-	6	
253	15	2-	2-	20	2-	15	

- = less than,

+ = greater than

a = sought but not detected

Serial Nos : 2136, 2111.

Plate Nos : 951-952, 954, 957-959

Laboratory Report No.6.

SPECTROCHEMICAL ANALYSIS OF SAMPLES FROM DIXON RANGE. WESTERN AUSTRALIA

by

A.D. Haldane

The following results were obtained for the semi-quantitative analysis of eight samples from the Dixon Range submitted by D. Dow, Pt, Au, Bi. Sb, As, W. Nb and Ta were sought but not detected in any sample.

All results are expressed in parts per million.

Sample No.	Ni	Co	Cu	Pb	Ag	Mo	Sn	Be	V	Zn	
6447:75	2000	300	60	a	a	4	a	a	600	a	Chromite
76	4000+	120	6000	40	a	6	a	a	20	a	Serpentinite
77	200	120	250	a	a	15	a	10	60	1600	Casson
78	100	40	60	a	a	a	a	a	500	a	Mn Casson
79	25	12	2500	30	a	a	a	a	200	a	Shale
80	100	40	2000	600	4	50	200	a	60	1400	Mn Casson
81	150	150	250	a	a	800	a	a	80	a	Casson
86	10-	80	40	a	5	a	a	a	250	a	Barytes

+ = greater than. - = less than. a = sought but not detected.

Serial Number 2128. Plate Number 960.

Laboratory Report No. 7:   21st January, 1966.

REPORT ON FOUR SAMPLES SUBMITTED FOR AGE DETERMINATION BY DEPARTMENT OF MINES, N.S.W.

by

C.D. Branch

Sample location: Western New South Wales.   Folio 23, file 65/7003 refers.

No.1 (1704) (65590060) Mainly subhedral laths of patch and film perthite, with rare laths of plagioclase: some laths bent. A little calcite and iron ore is present, and most cleavage cracks in the feldspars are iron stained. MICROPERTHOSITE. Rock unsuitable for K/Ar age, but may be suitable for total rock Sr/Rb age.

No.2 (1702) (65590061) Kaolinized feldspar as microphenocrysts and in groundmass, with interstitial quartz. Hornblende microphenocrysts have been almost entirely replaced by chlorite and epidote. MICROPORPHYRITIC HORNBLENDE-QUARTZ ANDESITE. Rock unsuitable for K/Ar age, but may be suitable for total rock Sr/Rb age.

No.3 (1703) (65590062) Trachytic groundmass containing feldspar microlites, chlorite clots, and altered pyroxene laths. Calcite amygdules are abundant. Rare augite microlites occur scattered and as clusters through the rock. AMYGDALOIDAL AUGITE ?ANDESITE. Rock unsuitable for K/Ar age, but may be suitable for total rock Sr/Rb age.

No.4 (1705) (65590063) Larger plagioclase laths have sericitized cores and clear, zoned, rims, but smaller laths are unaltered labradorite. Subhedral augite is abundant. Rare hornblende and biotite grains mainly pseudomorphed by chlorite. DOLERITE. Rock suitable for pyroxene separation for K/Ar age.

Samples 1, 2, 3 have been sent to Mike Rhodes to determine Rb/Sr content by X-ray fluorescence to determine suitability for Rb/Sr age determination. Sample 4 sent to Bill Pascoe for pyroxene separation.

Laboratory Report No. 8 28th January, 1966

PETROGRAPHIC DESCRIPTIONS OF ROCKS FROM MISIMA ISLAND AND STAR MOUNTAINS, T.P.N.G.

by

C.D. Branch

The six slides described here were prepared in the geological office, Port Moresby, and submitted by the Senior Resident Geologist (ref GS: G1006 of 7th December, 1965). Five slides are from Misima Island, for which the rock names and a description of alteration were requested. One slide is from the Star Mountains (collected by Mr. Cook, Australian Star Mountains Expedition), submitted for identification and description.

6457.81 (Misima 7)

PORPHYRITIC BIOTITE RHYODACITE DENSELY WELDED TUFF

Subhedral beta-quartz phenocrysts, embayed, and with undulose extinction. Plagioclase (?oligoclase-andesine) phenocrysts form fresh subhedral, broken laths, generally zoned and always twinned. Biotite flakes, pleochroic from pale yellow to dark brown, altered to chlorite along the cleavage. Groundmass composed of an amorphous to microspherulitic intergrowth of quartz and (?alkali) feldspar. Accessory minerals are apatite, iron ore, sphene, and calcite. The phenocrysts have a vague parallel orientation.

Apart from the undulose extinction in the quartz phenocrysts and the rare, small patches of calcite, this rock is unaltered. Rocks 6457.82 to 6457.85 are similar in composition, although the phenocrysts are a little smaller, but all display some degree of alteration, described below.

6457.82 (Misima 4)

Quartz and plagioclase phenocrysts shattered. Zoning absent in the plagioclase; some kaolinization. Biotite laths are largely pseudomorphed by bleached chlorite, and contain granules of sphene: some laths are bent. Small clusters of epidote granules are present in the groundmass.

6457.83 (Misima 10)

Phenocrysts and groundmass are micro-brecciated, but the quartz fragments show only a trace of undulose extinction and may indicate the onset of recrystallization. Plagioclase phenocrysts are kaolinized, especially in the cores, and sericite is developed along the cleavage. All biotite is pseudomorphed by bleached chlorite. Leucoxene is developed on the iron ore, and the granules are surrounded by narrow oxidization haloes.

6457.84 (Misima 12)

Similar to 6457.82, but kaolinization of plagioclase complete. Iron ore similar to 6457.83.

6457.85 (Misima 13)

Similar to 6457.82, but large calcite patches are common in the plagioclase, and shattering is confined to narrow zones through the rock.

Conclusions

The series of slides represent a volcanic rock, typified by 6457.81, which has been sheared. Increasing degrees of shearing are shown by 6457.85, 6457.82, 6457.84, and 6457.83. There has been little or no hydrothermal alteration.

6457.80 (Star Mountains)

This rock was originally a PORPHYRITIC RHYOLITE OR DELLENITE. It has been sheared and now contains abundant secondary biotite and chlorite, indicating that it has been metamorphosed in the GREENSCHIST FACIES, BIOTITE-CHLORITE SUBFACIES.

Anhedral quartz phenocrysts showing little strain and subhedral laths of fresh orthoclase are set in a schistose groundmass of intergrown biotite and chlorite flakes, and macerated quartz-feldspar dust. Plucking is evident on the margins of the phenocrysts. Rounded phenocrysts of (?) plagioclase contain porphyroblasts of biotite, pleochroic from light brown to dark greenish brown, and iron ore granules. Augen of microbreccia in the groundmass contain fragments of fresh plagioclase, orthoclase, and quartz.

Laboratory Report No. 9 1/2/66

ZINC CONCENTRATIONS IN THE MOLONGLO RIVER

by

J.R. Beevers

The waters, submitted by Mr. M. Elliot of the Department of the Interior were sampled on the dates shown. The localities are as described in Laboratory Report No. 25, 1965.

		14/12/65	12/1/66
		Total Zinc Concentration (p.p.m.)	
Point	A	<0.02	<0.02
	B	202	195
	C	95	162
	D	20.7	32.3
	E	0.2	0.02
	F	17.6	11.0
	G	0.78	0.7
	H	0.13	0.16

Laboratory Report No.10:

ZINC CONCENTRATIONS IN THE MOLONGLO RIVER

by

J.R. Beevers

The waters, sampled at the points indicated, were collected by Mr. M. Elliot of the Department of the Interior on 7th February, 1966.

	Total Zinc (ppm)
Point A	< 0.02
B	135
C	195
D	68
E	< 0.02
F	15.8
G	0.02
H	< 0.02

10th February, 1966

Laboratory Report No. 11: 9/3/66

GOLD ASSAYS ON MICRODIORITE INTRUSION

by

J.R. Beevers

A specimen of rock consisting of a microdiorite intruding a metamorphosed shale with pyrite along the contact was submitted by D.H. Blake for gold assay. The specimen, from Bougainville Island, has been described by I.R. Pontifex (Ore Mineralogy Report No. 6).

Gold assays were carried out on the metamorphosed shale, the microdiorite and the pyrite using solvent extraction and Atomic Absorption Spectrophotometry, with the following results.

	Gold Content (ppm)
Microdiorite	$<$ 0.2 ppm
Metamorphosed Shale	$<$ 0.2 ppm
Pyrite	$<$ 0.2 ppm

Laboratory Report No. 12:

SILICATE ANALYSES OF ROCKS FROM THE LOPEVI VOLCANO, NEW HEBRIDES.

by

J.M. Rhodes

Three samples of volcanic rocks from the Lopevi Volcano, New Hebrides, were submitted for silicate analysis by Mr. A. Warden, Senior Geologist of the New Hebrides Geological Survey.

The three samples were:-

LW3A - Vesicular vitrophyric hypersthene andesite. Collected from hot rock avalanche, N.E. side of Lopevi Volcano, July 13th 1963.

$LW3C_2$ - Porphyritic hypocrystalline olivine bearing augite basalt. Locality and date of collection as for LW3A.

LW17A - Porphyritic olivine bearing augite basalt. New "aa" lava tongues, Tematu anchorage, collected February 1964.

Prior to analysis the samples were ignited at 1000°C to avoid complications due to oxidation, loss of H_2O, CO_2 and other volatiles during sample preparation. The results are reported here on a water free basis, and the total iron figure is given as Fe_2O_3.

SiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, K_2O, TiO_2 and P_2O_3 were determined by J.M. Rhodes on the P.W. 1210 X-ray spectrograph and Na_2O and MnO were determined by flame photometry and atomic absorption spectroscopy by A.D. Haldane and J.R. Beevers.

Each sample was analysed twice for each oxide, with the exception of Na_2O, MgO and MnO. These oxides were determined only once.

Both analyses for the three samples are reported below.

	L.W. 3A		L.W. $3C_2$		L.W. 17A	
	(a)	(b)	(a)	(b)	(a)	(b)
SiO_2	62.0	62.3	55.4	55.8	51.7	51.9
Al_2O_3	15.7	16.1	14.8	15.0	17.6	17.5
Fe_2O_3	7.55	7.52	8.80	8.81	9.28	9.38
MgO	2.20	2.20	6.55	6.55	6.05	6.05
CaO	5.61	5.61	9.13	9.01	10.98	11.30
Na_2O	3.92	3.92	2.78	2.78	2.46	2.46
K_2O	1.84	1.86	1.26	1.26	0.71	0.71
TiO_2	0.73	0.73	0.63	0.62	0.63	0.63
P_2O_3	0.16	0.16	0.16	0.15	0.13	0.14
MnO	0.15	0.14	0.15	0.15	0.15	0.15
Total	99.86	100.54	99.66	100.13	99.69	100.22

Laboratory Report No. 13

GOLD ASSAYS ON FOUR ROCKS FROM THE PAPUAN BASIC BELT

by

J.R. Beevers

The rocks, from the Boden Bay and Bowutu Mountains one-mile sheets T.P.N.G. were submitted by H.L. Davies. The gold assays were carried out by solvent extraction and atomic absorption.

The assays are as follows:

	Au (ppm)	dwt/ton (Br)
65520477	<0.3	-
65520524	7.9	5.2
65520529	8.4	5.5
65520542	<0.3	-

18th March, 1966.

Laboratory Report No.14. 30th March, 1966

ZINC CONCENTRATIONS IN THE MOLONGLO RIVER

by

J.R. Beevers

Samples of water from the Molonglo River were submitted for analysis by Mr.M. Elliott of the Department of the Interior. The samples were taken on March 7th 1966, and the localities are as described in Laboratory Report No.25, 1965.

	Total Zinc (p.p.m.)
Point A	< 0.05
" B	114
" C	110
" D	97
" E	< 0.05
" F	9.8
" G	0.1
" H	0.05

Laboratory Report No.15. 14th April, 1966

ZINC CONCENTRATIONS IN THE MOLONGLO RIVER

by

J.R. Beevers

The sample locations are as given in previous reports.

Location	Total Zinc (p.p.m.)
Point A	< 0.02
" B	88.0
" C	81.0
" D	51.0
" E	0.05
" F	31.0
" G	0.68
" H	< 0.02

Laboratory Report No. 16: 22nd April, 1966.

PETROGRAPHIC DESCRIPTIONS OF ROCKS FROM NEW BRITAIN AND BOUGAINVILLE, T.P.N.G.

BY

C.D. Branch

The seven rocks described here were submitted by R.P. Macnab, geological office, Port Moresby, for a brief description and comments on the genesis. Specimens 1215 and 1216 are from the upper Warangoi area, central Bainings, east New Britain; and specimens 1217 to 1221 are from the Kieta Goldfield area, Bougainville.

NEW BRITAIN

Specimen 1215

QUARTZ-PLAGIOCLASE-HORNBLENDE SEMISCHIST

Handspecimen. Moderate dark grey fine-grained hornfels, with faint schistosity indicated by fine lenses of mafic minerals.

Thin section. The rock consists of a fine (0.02mm), even-grained mosaic of quartz (25-30%), plagioclase (40%), and iron ore (10-15%), surrounding lenticular patches of granular, green hornblende (20%). A few small plates of epidote, and ragged laths of biotite 0.01 mm long and pleochroic from pale yellow-brown to deep red-brown, accompany the hornblende.

This rock was probably a fine non-calcareous sediment. It has been metamorphosed to the albite-epidote-amphibolite facies mainly by thermal metamorphism, but the faint schistosity indicates a little contemporaneous shearing.

Specimen 1216

LABRADORITE-HORNBLENDE HORNFELS

Handspecimen. Dark grey-green hornfels speckled with white grains.

Thin section. Corroded laths of labradorite, zoned to calcic andesine on the margins, and crowded with dusty inclusions, form randomly orientated phenocrysts up to 0.8 mm long in a fine mosaic of plagioclase, pale green hornblende, and iron ore granules. Interstitial quartz, and biotite similar to that in specimen 1215, are accessories.

The hornfels texture of the rock and the granular hornblende suggest the rock has been thermally metamorphosed in the low amphibolite facies. However, the presence of relic phenocrysts of labradorite does not agree with the suggested grade ; granular andesine would be more appropriate. The texture and composition of the phenocrysts indicate the rock originally was a basalt. The original pyroxene was probably fine-grained and has been thermally retrograde metamorphosed to hornblende. The pale colour of the hornblende indicates it is low in iron, which suggests that the original basalt was a high-alumina type.

BOUGAINVILLE

Specimen 1217

HYDROTHERMALLY ALTERED (EPIDOTIZED) HORNBLENDE ANDESITE-AGGLOMERATE

Handspecimen. Rounded pale green blocks, up to 2cm across, in a moderately dark grey matrix. Pyrite grains are scattered through the rock.

Thin section. The blocks consist predominantly of anhedral pistacite (var. of epidote) surrounding ragged subhedral laths of pale green amphibole, 0.1 - 0.5 mm across, and clusters of sphene granules. The matrix to the blocks is patchy, and consist of (a) areas containing ragged subhedral sieve-textured laths and shreds of amphibole in a mosaic of sericitized and saussuritized plagioclase grains 0.5 mm across, with traces of quartz, epidote, chlorite, sphene, and iron ore (?pyrite); and (b) areas in which a mosaic of plagioclase granules surround plagioclase microphenocrysts. Area (b) may be blocks in the tuffaceous matrix represented by area (a).

The epidote has probably resulted from low temperature calcium metasomatism which accompanied the introduction of the pyrite.

Specimen 1218

HORNBLENDE MICRODIORITE - ANDESITE BRECCIA

Handspecimen. Medium grained grey microdiorite containing angular blocks 1cm across of dark grey andesite. Pyrite is scattered through the rock.

Thin section. The texture of the rock is very irregular and consists of clusters of subhedral zoned andesine-labradorite laths 0.8 - 0.05 mm long, and fibrous sieve-textured amphibole laths 1.0 - 0.5 mm across, with interstitial fibrous amphibole and chlorite, associated with patches of flow-orientated plagioclase microlites containing amphibole and plagioclase phenocrysts the same size as in the clusters. Both areas contain disseminated iron ore (?pyrite) granules, and a few of the amphibole phenocrysts are pseudomorphed by iron ore.

The handspecimen suggests the rock is a breccia, but alternatively, based on the thin section, the rock could represent a crystal mush, consisting of about 60% crystals, which was erupted causing partial segregation then freezing of the interstitial liquid. A little retrograde thermal metamorphism is indicated by the fibrous nature of the amphibole.

Specimen 1219

PARTLY EPIDOTIZED HORNBLENDE MICRODIORITE-ANDESITE AGGLOMERATE

Handspecimen. The rock is similar to specimen 1217 except that fine-grained blocks accompany the coarse, and the matrix is medium-grained. Pyrite is scattered through the rock.

Thin section. The matrix to the blocks is finely recrystallized. Epidotization is not so complete as in specimen 1217, and in 1219 the epidote granules form small discrete clusters scattered through the rock. The hornblende phenocrysts are in part retrograde metamorphosed to chlorite. The plagioclase laths are slightly kaolinized.

In this rock, the degree of retrograde thermal metamorphism is further advanced than in specimen 1218, leading to hornfelsing of the fine-grained matrix around the blocks.

Specimen 1220

CHLORITE-PLAGIOCLASE-EPIDOTE HORNFELS

Thin section. This rock is similar to specimen 1219 except the thermal metamorphism is more advanced, leading to complete recrystallization of the plagioclase as a fine mosaic, and of the hornblende as scattered chlorite flakes. The epidote clusters are recrystallized and the iron ore has developed a sieve texture, indicating the metamorphism was later than the introduction of these minerals.

Specimen 1221

LEACHED BIOTITE MICROGRANODIORITE

Handspecimen. White, fine-grained rock, with strong limonite staining along joints.

Thin section. The rock consists of sericitized zoned plagioclase laths (av. oligoclase-andesine), and ragged brown biotite laths with sphene patches and stained by limonite, in a fine mosaic of quartz. Anhedral plates of patch perthite are rare.

The rock may be a silicified microdiorite.

Laboratory Report No. 17: April, 1966.

PETROGRAPHIC EXAMINATION OF GOULBURN SLATE

by

C. Newbigin

The two varieties of slate submitted, one purplish-brown to purplish-grey, the other greenish-grey, have similar physical characteristics in hand specimen except that the greenish-grey slate is apparently slightly harder. The texture of both is compact with individual grains scarcely visible to the naked eye; the lustre ranges from matte to a silky sheen; and the cleavage is good but not perfect. Large crystals of pyrite (maximum 3-4mm; average 0.5-1mm) are visible in some specimens of green slate.

Thin section examination shows that the colour-difference is related to the hematite content. The slates consist of quartz (25-35%) with minor feldspar grains, in a network of sericite and chlorite shreds. In the green slate chlorite constitutes about 30%, and opaque material less than 1%, hence the green colour. In the purple slate chlorite constitutes 20-25% and opaque material - hematite, pyrite, and magnetite - 10-15%.

Finely-divided hematite is disseminated through the rock and also recurs in small lenticular aggregates; its colour masks the chloritic colouring. Carbonates are absent. Grain size ranges from 0.02mm to 0.08mm; most of the green slate may be a little finer grained than the purple slate.

Conclusion

The slates contain iron oxide and sulphides, and the presence of these minerals could lead to staining during weathering. However an examination of slate in outcrop showed little staining except around rare macroscopic grains of pyrite. The absence of talc and associated minerals indicate that the slate should not polish and become slippery with use. Minerals likely to cause structural weakness such as calcite or weathered feldspars are either absent or present in minute quantity.

No minerals or structures likely to impair the usefulness of this slate as paving material were noted under the microscope but it is may be a little soft for use where heavy foot traffic is expected.

Laboratory Report No.18. 16th May, 1966

ZINC CONCENTRATIONS IN THE MOLONGLO RIVER.

by

J.R. Beevers

The samples were taken on 9th May, 1966, and submitted by M. Elliott of the Department of the Interior. The sample sites are as previously reported.

Location	Total Zinc.(p.p.m.)
A	0.10
B	64. 0
C	64. 0
D	60. 0
E	- 0. 05
F	26. 0
G	0.15
H	- 0.05

Laboratory Report No. 19:

BARIUM IN GRANITES FROM THE KATHERINE-DARWIN REGION, N.T.

by
J.M. Rhodes

Introduction

The granitic rocks of the Katherine-Darwin region belong to two groups, an older basement group, and a younger intrusive group (Rhodes, 1965; Heier and Rhodes, 1966; Richards, Berry, and Rhodes, 1966). The older basement granites, represented by the granites of the Rum Jungle Complex, are about 2,400-2,600 m. yrs old (Richards, Berry, and Rhodes, 1966), and the younger intrusive granites are about 1,700-1,800 m. yrs. old (Leggo pers.comm.).

Heier and Rhodes (1966) have shown that both granite groups contain similar quantities of uranium and thorium and that both are enriched in these elements relative to other granitic rocks. They have suggested that the younger granites may have formed by re-mobilisation or re-melting of the older basement material. As a check on this hypothesis it was decided to compare the distribution of other trace elements in the two granite groups, particularly those which occur more abundantly in granitic rocks. One such element is barium, and the barium content of these granites are presented and discussed below.

Method

Barium was determined in finely powdered rock samples using the P.W. 1210 automatic X-ray spectrograph. Matrix variations were allowed for by finding the ratio of the barium peak to the scattered background. This method is considered to be as reliable as calculating mass absorption coefficients from the silicate analyses of the rocks. The reproducibility is within ± 2% of the amount present and the accuracy is believed to be within ± 5% of the amount present. The calibration is linear up to 1% barium and the detection limit is about 30 ppm.

The barium contents of 39 granites from the Katherine-Darwin region are given in Table 1.

Discussion

From these results it is seen that both granite groups have similar distribution patterns. The average barium content of the 25 rocks from the Rum Jungle Complex is 956 ppm with a standard deviation of 520 ppm. The 14 younger granites have an average barium content of 916 ppm with a standard deviation of 529 ppm. Furthermore the average barium values for both granite groups are considerably higher than is common in granitic rocks. Thus Goldschmidt (1954) gives the average barium content of granite as 480 ppm. More recently Taylor (1965) estimates the figure as 600 ppm in granite and 500 ppm in granodiorite.

The barium content of the granites is a useful petrological indicator. It is high in the earlier granodiorites and decreases as the evolution of the granite body proceeds. Thus, in the Rum Jungle Complex, the early large feldspar granite contains an average of 1,356 ppm Ba; the coarse granite an average of 567 ppm Ba; and the later leucocratic granite an average of 530 ppm Ba. In most cases the type of granite can be determined from its barium content alone. Similarly in the Mount Shoobridge granite, the marginal variety contains 2,040 ppm Ba; the main porphyritic variety 1,760 ppm Ba; and the central leucocratic variety 1,135 ppm Ba. The order given above corresponds to the order of intrusion deduced from field relationships.

Conclusions

1. The barium content of granites in the Katherine-Darwin region is high compared with "average" granites.

2. The similar distribution pattern of barium, with similar high average values, in both the older and younger granites suggests some relationship between the two groups. It is suggested that the younger granites have originated by remobilisation of the older basement granites.

3. The barium content of granites is a useful indicator of the order of emplacement of granites in a granite complex.

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TABLE 1 - Barium in Granites

RUM JUNGLE COMPLEX

Sample No.	Granite Type	p.p.m. Ba
D52/8/10	Leucocratic granite	550
D52/8/14	Leucocratic granite	65
D52/4/12	Leucocratic granite	390
D52/4/21	Leucocratic granite	565
D52/4/28	Leucocratic granite	505
D52/4/18	Pegmatite	220
D52/8/11	Mt. Fitch granite	1,425
D52/8/13	Coarse granite	635
D52/8/18	Coarse granite	480
D52/8/19	Coarse granite	535
D52/4/22	Coarse granite	620
D52/4/27	Coarse granite	665
D52/8/9	Large Feldspar granite	765
D52/8/12	Large Feldspar granite	1,400
D52/4/13	Large Feldspar granite	2,130
D52/4/17	Large Feldspar granite	1,150
D52/4/19	Large Feldspar granite	835
D52/4/20	Large Feldspar granite	1,490
D52/4/25	Large Feldspar granite	1,720
D52/4/29	Large Feldspar granite	1,510
D52/4/14	Granite gneiss	1,235
D52/4/15	Metamorphics	1,210
D52/4/24	Metamorphics	1,730
D52/4/11	Diorite	870
D52/4/16	Diorite	1,210

YOUNGER GRANITES

Sample No.	Granite Type	p.p.m. Ba
D53/9/10	Cullen granite	530
D53/9/1	" "	1,550
D52/8/5	" "	505
D52/8/7	Allia Creek granite	390
D52/4/5	Mt. Bundey granite	850
D52/8/20	Prices Springs granite	1,165
D52/8/21	Prices Springs granite	1,000
D52/8/22	Mt. Shoobridge granite (central)	1,135
D52/8/23	Mt. Shoobridge granite (marginal)	2,040
D52/8/24	Mt. Shoobridge granite (porphyritic)	1,760
D52/8/25	Burnside granite	465
D52/8/26	" "	455
D52/4/4	Burton Creek granite	650
D52/8/8	Litchfield granite	330

Laboratory Report No. 20:

PETROGRAPHIC EXAMINATION OF SEVERAL SPECIMENS OF PROSPECTIVE BUILDING STONE FROM THE CANBERRA AREA.

by

W. Oldershaw,
with additional notes on handspecimens by
C. Newbigin

No.: 65180017

Name: Arumbera Sandstone

Locality: 10 miles south-west of Alice Springs

Petrography: The rock is a silicified sandstone forming part of the Lower Cambrian Arumbera Greywacke. It is an even-grained, fine-grained quartz sandstone with a siliceous cement. Some parts show a small-scale current bedding. Coarser bedding is visible as lighter bands in this otherwise uniform red-brown rock.

Uses: Arumbera Sandstone has been used in Alice Springs as a building stone, e.g. the John Flynn Memorial Church.

No.: 65360065

Name: Burrinjuck Granite

Locality: Three miles south of Wee Jasper, N.S.W.. The sample was taken from an outlier of Burrinjuck Granite marked G1 on the Canberra 1:250,000 scale geological map.

Petrography: In hand specimen, this specimen is generally fine, even-grained, black-speckled, grey granodiorite, but there are a few patches, 0.5 - 1cm across, of dark material. Under the microscope the rock is seen to consist of fresh, zoned euhedral crystals of oligoclase (about 2mm across), flakes of both fresh and chloritised biotite, irregularly shaped crystals of hornblende, with interstitial quartz and orthoclase microperthite. A few grains of pyrite, comprising less than 0.5 percent of the rock, were found.

Uses: The outcrop examined is very small and may be a faulted slice. Similar rock may occur in the main mass and may be sufficiently sound and attractive to be quarried for use as a building stone. If the grain size and colour are constant over large areas, it would be a very attractive facing stone.

No.: 65360066

Name: Painter Porphyry

Locality: Half a mile along Tharwa road from Canberra-Cooma road. (Military Grid Reference: Zone 08/212600:0622800)

Petrography: A fresh, solid quartz-feldspar porphyry; in hand specimen it shows 5-6mm phenocrysts of quartz and feldspar, generally irregular in shape, scattered at random in a pale grey matrix. Between these large grains many smaller laths are scattered irregularly.

The thin section shows embayed phenocrysts of quartz 2 to 4mm across, fresh orthoclase, sericitised and zoned andesine, and flakes of chloritised biotite, set in a matrix of intergrown minute quartz and feldspar crystals and limonite dust. The plagioclase has been extensively altered to sericite, epidote and calcite. No pyrite was found.

Uses: Sound, strong rock, but outcrops are closely jointed. Could be used for rubble walls and aggregate.

No.: 65360067

Name: Boro Granite

Locality: 4 to 5 miles south-south-east of Rossi, near Captains Flat. (Military Grid Reference: zone 08/253000:0617000)

Petrography: In hand specimen this is an extremely attractive coarse-grained biotite granite, with salmon-pink orthoclase and pale green to white plagioclase amongst the colourless quartz and black mafic materials. Under the microscope the rock is seen to consist of shattered crystals of quartz with undulose extinction and granulated margins, epidotised oligoclase, iron-stained kaolinised orthoclase and chloritised biotite. The rock has been dynamically metamorphosed. The attractive red and green colours are due to alteration products of the feldspars.

Uses: The hand specimen contain numerous cracks and the exposures are shattered and weathered. A similarly attractive rock may occur nearby and may be sound enough to be used as a facing stone.

No.: 65360071

Name: Harrisons Peak Granite

Locality: Harrisons Peak, two miles north-east of Captains Flat, N.S.W.

Petrography: The specimen is a fine-grained, even-grained, biotite granite and is representative of the southern marginal phase of the main granite mass. The sample contains numerous minor shatter zones and cracks, but this may be due to the sample having been obtained by the use of explosives. In appearance, it is pale pink with only a small percentage of interstitial dark mineral. The quartz grains are clear.

Under the microscope the rock is seen to consist of quartz, orthoclase and microcline microperthite, oligoclase and chloritised biotite. The quartz shows undulose extinction, granulated margins and sutured contacts. Many crystals of oligoclase are bent. Although the rock has been highly strained it may have been subsequently annealed, since few open cracks were noted. The orthoclase shows slight kaolinisation, the plagioclase shows slight sericitisation, and the biotite is extensively chloritised. No pyrite was seen.

Uses: It should be possible to extract sound rock from the tor-studded hillside and this rock should be capable of taking a high polish to form an attractive pink facing stone.

No.: 65360072

Name: Saplings Flat Granite

Locality: Jerangle, about 40 miles south-east of Canberra. (Military Grid Reference: 08/238500:0577500).

Petrography: The specimen is a medium-grained even-grained biotite granite. It is light coloured; the feldspars are mainly pale pink but some are pale blue-green, possibly because of the presence of secondary minerals.

The quartz is clear and darker than the feldspars. The dark minerals are rather sparse and are very fine-grained. Under the microscope the rock is seen to consist of shattered crystals of quartz with undulose extinction, orthoclase and microcline microperthite, oligoclase, and biotite. The minerals show signs of strain and many contain open cracks. The biotite is fresh and the feldspars are only slightly altered. No pyrite was seen.

Uses: The rock is fresh and contains no deleterious minerals. It is extensively shattered, but crops out as massive tors over a wide area, therefore sound rock should be available.

Laboratory Report No. 21:

GOLD AND SILVER ASSAY ON A SAMPLE FROM T.P.N.G.

by
J.R. Beevers

The whole of the sample (66-P-1) submitted (303gms) was panned to remove the light material which consisted essentially of quartz and broken shells. The heavy material (0.150gms) was examined under the microscope. Essentially, it consisted of magnetite and other oxide of iron, but about six particles of gold could be clearly seen. They were approximately 0.2mm in cross section. The whole of this heavy material was assayed for gold and silver,and the result computed to the weight of the original sample submitted.

Au 1.18ppm (0.77 dwts/ton)
Ag 0.16ppm

The sample was submitted by a prospector from Papua - Mr. Grinberg, 32 Carrington Street Sydney - and was from a point 8 miles west of the Onomo River.

10th June, 1966

Laboratory Report No. 22:

ZINC CONCENTRATIONS IN THE MOLONGLO RIVER

by

J.R. Beevers

The waters were samples on 7th June, 1966. The sample points are as previously described.

Point	Total Zinc (ppm)
A	<0.1
B	64.0
C	56.0
D	64.0
E	<0.1
F	31.5
G	1.57
H	<0.1

10th June, 1966

Laboratory Report No.23.

29th June, 1966.

ANALYSIS OF A COPPER PRECIPITATE

by

J.R. Beevers

The copper precipitate was submitted by Dr.Rex Patterson, M.H.R., with a request for a partial analysis. The sample was taken near the Mount Perry Mine, about sixty-five miles west of Bundaberg (Maryborough 4-mile Sheet) Queensland. The partial analysis gave the following results:

Copper	51%
Iron	6.3%
Lead	3,800 p.p.m.
Zinc	825 p.p.m.
Manganese	610 p.p.m.
Silver	$<$ 40 p.p.m.
Gold	$<$ 0.1 p.p.m.

Laboratory Report No.24. 30th June, 1966.

SPECTROCHEMICAL ANALYSIS OF ORIENTATION SAMPLES FROM WAU, T.P.N.G.

by

A.D. Haldane.

The following results were obtained for the spectrochemical analysis of 70 soil and rock samples from the Wau area T.P.N.G. submitted by R.G. Horne.

All results are expressed in parts per million.

Details of the localities from which the samples were collected are given on file 65/6415.

SAMPLE NO.	Ni	Co	Cu	Pb	Ag	Au	Mo	V	As
6422 0001	80	80	50	a	400	a	2	10	700
0002	60	60	40	a	400	15	1	25	700
0003	60	8	25	a	300	10	a	5-	500
0004	1000	40	5000+	a	1000	a	5	a	300
0005	150	15	300	a	1000+	a	7	a	300
0006	15	7	100	10	150	a	a	40	300
0007	a	3-	50	5-	10	a	a	7	500
0008	35	10	80	15	30	a	a	60	300
0009	15	10	80	15	80	a	a	80	300
0010	30	12	40	10	80	a	a	60	a
0011	7	3	12	5	2	a	a	100	a
0012	5	10	15	5	2	a	a	60	a
0013	5	8	15	15	2	a	a	80	a
0014	25	25	60	50	200	a	2	60	a
0015	7	15	20	a	7	a	1	60	500
0016	a	12	15	5	2	a	a	50	a
0017	a	12	15	10	2	a	a	80	a
0018	15	50	10	5	1-	a	1	60	a
0019	5	10	15	10	a	a	a	60	a
0020	7	7	12	5	2	a	1	60	a
0021	20	15	20	5	50	10	2	25	700
0022	7	7	15	35	60	25	a	40	a
0023	5	5	15	25	70	a	a	30	a
0024	12	12	40	100	15	a	a	80	a
0025	a	3	25	5-	a	a	a	80	a
0026	5	20	40	15	5	a	1	150	a
0027	20	3-	100	1000	1000	a	7	5	a
0028				No Result					

SAMPLE NO.	Ni	Co	Cu	Pb	Ag	Au	Mo	V	As
6422 0029	5	10	20	5	a	a	a	80	a
0030	15	20	50	5	1	a	1	150	a
0031	5	12	30	5	a	a	a	150	a
0032	a	a	20	a	a	a	a	30	a
0033	5	12	50	10	2	a	a	80	a
0034	a	a	25	a	a	a	a	50	a
0035	17	20	25	5-	1-	a	a	80	a
0036	a	20	40	5	a	a	a	100	a
0037	5	20	40	5-	a	a	a	200	a
0038	5	7	20	5	1	a	a	100	a
0039	a	a	2	a	a	a	a	20	a
0040	a	a	7	5	2	a	a	80	500
0041	a	3	15	5	a	a	a	60	a
0042	a	3-	12	a	a	a	a	7	a
0043	a	3-	15	5	a	a	1	80	a
0044	5	5	20	10	a	a	a	40	a
0045	a	8	12	5-	a	a	a	30	a
0046	a	3	20	5	a	a	a	40	a
0047	5	10	15	10	a	a	a	80	a
0048	a	8	12	5	a	a	1	80	a
0049	a	a	12	5-	a	a	a	40	a
0050	a	5	7	5-	a	a	a	40	a
0051	a	a	15	15	1-	a	a	30	a
0052	a	a	10	5	a	a	a	30	a
0053	10	10	15	a	1-	a	a	40	a
0054	5	10	15	a	a	a	a	25	a
0055	a	3-	3	5-	a	a	a	40	a
0056	5-	3-	15	a	a	a	a	25	a
0057	12	25	20	5-	1-	a	a	40	a
0058	7	12	30	5-	a	a	a	50	a
0059	5	12	20	5-	a	a	a	60	a
0060	10	12	20	5-	1-	a	a	40	a
0061	10	12	20	5-	1-	a	a	60	a
0062	5-	8	2-	5-	a	a	a	40	a
0063	a	a	5	a	a	a	a	15	a
0064	a	7	3	5-	a	a	a	40	a
0065	a	3	2-	5-	a	a	a	25	a
0066	a	a	2-	a	a	a	a	50	a
0067	a	a	2-	5-	a	a	a	50	a
0068	a	a	2	5-	a	a	a	25	a
0069	a	a	20	700	3	a	a	40	a
0070	a	a	10	5-	a	a	a	30	a

a = sought but not detected. - = less than. + = greater than.

Plate Nos. 946, 947, 948. Serial No. 2116