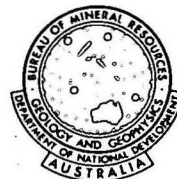


1972/72

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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF
NATIONAL DEVELOPMENT
BUREAU OF MINERAL
RESOURCES, GEOLOGY
AND GEOPHYSICS



Record 1972/72



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

Compiled by

B. Labonne

Part I. January to June, 1971

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 It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.

BMR
Record
1972/72
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MISCELLANEOUS CHEMICAL, PETROGRAPHIC AND MINERAGRAPHIC
INVESTIGATIONS CARRIED OUT IN THE GEOLOGICAL LABORATORY

Compiled by B. Labonne

RECORD 1972/72

Part I. January to June, 1971

The miscellaneous chemical, petrographic and mineragraphic investigations carried out in the Geological Laboratory, Bureau of Mineral Resources during 1971 are collated in this Record. The results of these investigations are presented in a series of Laboratory Reports which are arranged in numerical (and hence chronological) order in the Record. The Record is divided into two parts: the first covers the period January to June, and the second the period July to December. As Laboratory Reports Numbers 1, 7, and 79 are confidential, they have been removed from the main parts of the Record and placed in a Supplement. Distribution of this Supplement is restricted.

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

PART I

JANUARY to JUNE, 1971

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CHEMICAL ANALYSIS OF SEDIMENTS FROM
MATUPI HARBOUR, NEW BRITAIN.

by

J.W.Sheraton

Five samples of sediments from Matupi Harbour, New Britain, were submitted by I.B. Lambert for major element analysis. The analyses were carried out by X-ray fluorescence, using material ignited at 900°C for two hours.

Sample No.	1	2	3	4	5
SiO ₂	61.8	66.6	60.3	65.3	64.3
TiO ₂	0.94	0.86	0.88	0.94	0.87
Al ₂ O ₃	16.75	17.06	16.14	16.18	16.04
* Fe ₂ O ₃	7.10	5.96	7.59	6.48	5.76
MnO	0.16	0.06	0.07	0.07	0.10
MgO	2.6	1.6	2.3	1.7	2.4
CaO	5.78	3.92	6.60	4.62	4.73
Na ₂ O	3.6	3.2	2.7	3.1	4.3
K ₂ O	2.24	2.13	1.85	1.99	2.08
P ₂ O ₅	0.30	0.24	0.28	0.23	0.19
Total	101.3	101.6	98.7	100.7	100.8
Loss on ignition	6.08	8.53	13.32	9.93	5.86

* Total iron as Fe₂O₃

CHEMICAL ANALYSIS OF VOLCANIC ROCKS FROM EASTERN PAPUA

by

J.W. Sheraton

Twenty-four samples of volcanic rocks from Eastern Papua were submitted by I.E. Smith for major element analysis. The analyses were carried out by X-ray fluorescence using material ignited at 900°C for two hours.

Sample No.	3298*	3300*	3335*	3553*	3557A*	4268*
SiO ₂	49.2	49.6	55.5	56.9	54.4	48.6
TiO ₂	0.83	0.56	0.75	1.18	1.08	0.53
Al ₂ O ₃	15.86	15.02	17.84	13.34	15.53	13.39
* Fe ₂ O ₃	9.98	9.25	8.18	6.70	8.29	9.16
MnO	0.17	0.15	0.17	0.10	0.14	0.15
MgO	7.6	8.6	3.3	8.1	9.2	13.3
CaO	11.74	11.69	7.88	6.78	7.39	9.98
Na ₂ O	2.7	2.5	3.2	2.6	3.4	2.7
K ₂ O	3.04	2.57	3.21	4.24	1.57	2.46
P ₂ O ₅	0.45	0.39	0.56	0.50	0.31	0.38
Total	101.6	100.3	100.6	100.4	101.4	100.7
Loss on ignition	1.24	1.50	3.05	0.38	0.46	1.24
Sample No.	6057*	3402B	3402C	3403C	3403D	3406A
SiO ₂	49.2	51.0	51.0	58.5	57.4	51.3
TiO ₂	0.68	1.12	1.11	0.80	0.77	1.01
Al ₂ O ₃	10.59	14.63	14.56	20.02	19.28	19.57
* Fe ₂ O ₃	11.38	10.75	10.59	6.52	6.16	7.73
MnO	0.19	0.14	0.13	0.59	0.12	0.15
MgO	10.9	6.3	6.0	1.7	1.7	4.2
CaO	13.29	10.85	10.73	3.25	5.52	7.86
Na ₂ O	1.5	5.3	4.8	4.2	4.1	2.9
K ₂ O	2.30	1.35	1.74	3.25	3.46	3.88
P ₂ O ₅	0.47	0.89	0.88	0.48	0.44	0.69
Total	100.5	102.3	101.5	99.3	98.9	99.3
Loss on ignition	3.13	3.36	3.37	3.85	1.44	3.24

Laboratory Report No.3.

Sample No.	3406B	3440	3441	3442	3443	3444
SiO ₂	52.3	52.1	52.1	49.9	48.0	61.7
TiO ₂	0.98	2.00	1.88	2.14	1.01	0.56
Al ₂ O ₃	20.63	14.25	13.56	15.13	14.10	18.45
* Fe ₂ O ₃	6.85	7.79	7.68	8.37	10.27	5.18
MnO	0.15	0.12	0.11	0.13	0.17	0.07
MgO	2.7	8.1	8.4	9.0	8.8	2.0
CaO	6.83	6.81	6.74	6.81	10.9	4.71
Na ₂ O	4.1	2.3	1.8	1.8	1.7	4.2
K ₂ O	4.18	5.82	5.55	5.30	3.95	4.26
P ₂ O ₅	0.57	1.10	1.02	1.10	0.88	0.37
Total	99.3	100.3	98.9	99.8	99.8	101.6
Loss on ignition	3.58	1.30	0.45	8.17	4.78	2.17

Sample No.	3445	3446	3681A	3689A	3689C	3689E
SiO ₂	58.2	58.7	67.8	66.2	60.5	60.8
TiO ₂	1.18	1.13	0.49	0.51	0.87	0.74
Al ₂ O ₃	13.83	13.96	16.97	17.16	15.16	15.26
* Fe ₂ O ₃	6.39	6.44	3.65	4.07	5.89	6.28
MnO	0.10	0.09	0.06	0.08	0.09	0.10
MgO	7.6	7.4	2.9	2.4	4.5	6.7
CaO	6.70	6.64	3.47	4.40	6.05	6.54
Na ₂ O	2.6	2.5	3.9	4.0	3.2	3.5
K ₂ O	4.42	4.14	2.23	3.06	2.54	2.14
P ₂ O ₅	0.55	0.47	0.09	0.25	0.30	0.22
Total	101.6	101.5	101.5	102.1	99.2	102.3
Loss on ignition	3.55	0.41	0.08	1.67	2.36	1.45

* Sample numbers are prefixed 6852. Remainder are prefixed 6952.

* Total iron as Fe₂O₃

Identification of minerals in a
phosphatic nodule from Coffs Harbour

by

G.H. Berryman

A sample of a phosphatic nodule dredged from a ledge at a depth of 200 metres from near Coffs Harbour, N.S.W., was submitted by J.E. Marshall for X-ray diffraction analysis. The minerals identified, in their order of relative intensities are as follows.

Sample No.

70631002

Apatite*,

Magnesian-Calcite

*Positive identification of this mineral can not be made but the X-ray Diffraction pattern compares closely to the A.S.T.M. index patterns for Fluorapatite and/or Carbonate-Apatite (Dahlite). The above index does not contain a pattern for Apatite.

Source of Radioactivity in the
Crater Formation, Rum Jungle

by

R.N. England

Fresh drill core and heavy mineral concentrates of leached surface material were examined microscopically with the aid of autoradiographs and later by electron probe. In both cases the major source of radioactivity is an opaque (translucent brown in some leached samples) phosphates containing appreciable amounts of Th but no detectable U

POLISHED THIN SECTIONS OF FRESH CORE (4 examined in detail)

The most radioactive core material is a pebble conglomerate containing abundant (50%) large angular fragments (up to several centimetres across) of vein quartz in various stages of recrystallization. The matrix consists mainly of a fairly fine-grained aggregate of deep green moderately birefringent chlorite with some fine-grained quartz and carbonate. Euhedral and fragmentary zircons and anhedral opaques in the matrix make up the heavy fraction of the rock.

Autoradiographs show that opaque grains which are in the order of 1% of the matrix are the sole source of significant radioactivity and over half of the opaques blacken the photographic plate. Electron probe examination revealed the presence of the following elements in the following very approximate order of abundance.

P, Th, Fe, Ca, Si, Al, Ti, Ce

The opaques were separated but failed to give an X-ray pattern which could be attributed to the radioactive mineral. Such a difficulty is not unexpected in the case of a "mineral" which may be amorphous or metamict.

Two attempts were made to obtain a gamma-ray spectrum but both failed because of the poor performance of the instrument at low intensities.

POLISHED GRAIN MOUNTS OF HEAVY MINERAL CONCENTRATES OF SURFACE MATERIAL
(4 examined in detail)

The concentrates consist mainly of angular grains of iron oxide minerals with a few zircons which vary in shape from euhedral to rounded. Quartz may be present in composite grains with iron oxide or as separate grains. Angular fragments of dolomite are quite common while some

samples contain appreciable amounts of galena, sphalerite and chalcopyrite in composite or separate grains.

Sources of radiation are rare in some samples but moderately common in others. They are generally opaque but in rare cases may have a reddish brown translucence with moderately high refringence and birefringence. Their composition was found to be similar to the mineral from the fresh sample described above.

Two altered zircons in one sample were found to contain veins and patches of a thorium mineral thought to be thorianite but these were rare compared with the phosphate. A X-ray pattern, possibly of thorianite but more likely to be rutile was evident from two of the concentrates.

Laboratory Report No. 6

21st January, 1971

Identification of minerals in a dredge sample
taken near Fraser Island, Queensland

by

G.H. Berryman

A sample of calc-arenite dredged from a depth of 512 metres near Fraser Island, Queensland, was submitted by J.E. Marshall for X-ray diffraction analysis.

Calcite, apatite and a trace of quartz were identified.

The apatite pattern was similar to that given in the A.S.T.M. index for "Strontium Apatite".

Zinc Content of Molonglo River Water.

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling Date: 11.11.70.

Sampling Points:	Sp.Cond.	pH	Zn	Fe	Gauge Reading.
Molonglo River at:					
Burbong	275	5.8	0.43	0.10	0.79'
Honeysuckle Creek	199	7.5	0.04	0.90	
Lake Burley Griffin at:					
Kings Avenue Bridge	191	7.2	0.09	1.20	
Commonwealth Ave. Bridge	168	7.2	0.09	2.20	
Scrivener Dam	186	8.5	0.09	2.80	24.90'
Molonglo River below:					
Scrivener Dam	144	7.1	0.18	3.60	8.39'

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling Date: 18.11.70.

<u>Sampling Points:</u>	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	176	7.2	.72	2.0	0.72'
Honeysuckle Creek	279	7.1	.14	1.3	
Lake Burley Griffin at:					
Kings Avenue Bridge	147	7.4	.10	3.1	
Commonwealth Av. Bridge	160	7.6	.10	2.7	
Scrivener Dam	138	7.8	.10	3.2	24.90'
Molonglo River below :					
Scrivener Dam	144	7.3	.08	2.8	3.25'

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling Date: 25.11.70.

Sampling Points	Sp.Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	223	7.7	.37	1.0	0.5'
Honeysuckle Creek	165	8.0	.09	1.0	
Lake Burley Griffen at:					
Kings Avenue Bridge	156	6.8	.08	2.8	24.89'
Commonwealth Av. Bridge	155	7.9	.08	3.0	
Scrivener Dam	158	8.4	.09	3.5	
Molonglo River below -					
Scrivener Dam	151	7.9	.06	3.1	

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr.B. Fitzgerald of the Department of works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling Date: 2.12.70.

<u>Sampling Points:</u>	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	241	7.5	1.0	.7	0.51'
Honeysuckle Creek	162	7.7	.09	2.0	
Lake Burley Griffin at:					
Kings Avenue Bridge	142	7.6	.06	2.4	
Commonwealth Av. Bridge	147	7.2	.07	2.3	
Scrivener Dam	149	7.6	.09	2.7	24.92'
Molonglo River below -					
Scrivener Dam	160	7.3	.12	2.4	3.10'

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 9-12-70.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	225	7.6	.36	0.60	0.48'
Honeysuckle Creek	149	7.6	.10	2.40	
Lake Burley Griffin at:					
King's Avenue Bridge	150	7.5	.08	2.9	
Commonwealth Avenue Bridge	150	7.5	.08	2.9	
Scrivener Dam	150	7.6	.08	3.0	24.97'
Molonglo River below Scrivener Dam					
	154	7.6	.08	3.2	3.88'

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 16-12-70.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	180	6.3	.56	1.8	0.94'
Honeysuckle Creek	150	6.6	.13	1.9	
Lake Burley Griffin at:					
King's Avenue Bridge	116	6.5	.13	3.5	
Commonwealth Avenue Bridge	127	6.5	.30	3.2	
Scrivener Dam	162	6.6	.09	3.0	24.95'
Molonglo River below Scrivener Dam					
	149	6.9	.09	2.8	3.54'

Laboratory Report No. 14

3rd February, 1971

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 23-12-70.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
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Molonglo River at:

Burbong	182	7.4	.23	.40	0.61'
Honeysuckle Creek	107	7.6	.03	.70	

Lake Burley Griffin at:

King's Avenue Bridge	116	7.3	.07	2.3	
Commonwealth Avenue					
Bridge	122	7.1	.15	2.9	
Scrivener Dam	153	7.4	.07	2.5	24.92'

Molonglo River below
Scrivener Dam

	158	7.0	.09	2.4	2.05'
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Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 31-12-70.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	180	7.2	.53	.8	1.16'
Honeysuckle Creek	113	7.5	.06	.5	
Lake Burley Griffin at:					
King's Avenue Bridge	136	7.4	.09	2.8	24.95'
Commonwealth Avenue Bridge	131	7.4	.11	3.2	
Scrivener Dam	143	7.5	.08	3.4	
Molonglo River below Scrivener Dam	140	7.5	.08	3.4	

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 6-1-71.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
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Molonglo River at:

Burbong	198	7.0	.34	1.2	0.83'
Honeysuckle Creek	141	7.4	.06	0.5	

Lake Burley Griffin at:

King's Avenue Bridge	134	7.8	.06	2.0	
Commonwealth Avenue Bridge	132	7.6	.09	3.1	
Scrivener Dam	138	7.6	.08	3.3	24.93'

Molonglo River below
Scrivener Dam

139	7.6	.08	3.5	3.22'
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Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 13-1-71.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	227	7.6	.19	0.3	0.38'
Honeysuckle Creek	152	7.7	.03	0.5	
Lake Burley Griffin at:					
King's Avenue Bridge	129	7.6	.06	1.8	24.95'
Commonwealth Avenue Bridge	131	7.6	.07	2.6	
Scrivener Dam	132	7.4	.11	3.1	
Molonglo River below Scrivener Dam	139	7.2	.09	3.8	

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of six samples from the Molonglo River and Lake Burley Griffin. The samples were submitted by Mr. B. Fitzgerald of the Department of Works.

Zinc and iron values are given in ppm and specific conductivity in umho/cm.

Sampling date : 20-1-1971.

SAMPLING POINTS	Sp. Cond.	pH	Zn	Fe	Gauge Reading
Molonglo River at:					
Burbong	241	7.4	.16	.30	0.59'
Honeysuckle Creek	143	7.4	.04	2.6	
Lake Burley Griffin at:					
King's Avenue Bridge	136	7.4	.04	1.7	
Commonwealth Avenue Bridge	137	7.1	.07	2.3	
Scrivener Dam	134	7.4	.07	3.1	24.95'
Molonglo River below Scrivener Dam					
	133	7.3	.06	3.2	2.74'

Identification of minerals in evaporites
from B.M.R. No. 1, Mt. Liebig, N.T.

by

G.H. Berryman

14 samples from B.M.R. No. 1, Mt. Liebig, 210 km west of Alice Springs, N.T., were submitted by P.J. Kennewell for mineral identification.

The analyses were carried out by X-ray diffraction and the minerals identified, in their order of relative intensities appear in the table below.

Sample No.	Depth	Minerals Identified
70500129	40'-6"	Gypsum, quartz, dolomite, chlorite, muscovite.
70500128	250'-4"	Gypsum, dolomite, quartz, chlorite, muscovite.
70500159	430'-431'	Halite, Anhydrite, quartz (tr).
70500160	431'-432'	Halite, anhydrite, chlorite, quartz (tr).
70500161	432'-433'	Halite, anhydrite, chlorite, quartz (tr).
70500162	433'-434'	Halite, anhydrite, chlorite.
70500136	450'-7"	Anhydrite, halite, dolomite, chlorite, quartz, muscovite.
70500135	462'-2"	Dolomite, anhydrite, quartz, halite, chlorite, muscovite.
70500130	572'-11"	Halite, anhydrite, Quartz (tr).
70500131	603'-9"	Anhydrite, halite, dolomite, quartz, chlorite (tr).
70500132	888'-9"	Anhydrite, dolomite, quartz, halite, chlorite, muscovite.
70500133	986'-9"	Anhydrite, quartz, dolomite, chlorite, muscovite.
70500137	987'-1"	Dolomite, quartz, chlorite, muscovite, anhydrite, halite.
70500134	987'-11"	Anhydrite, halite, quartz, dolomite, chlorite, muscovite (tr).

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of nine water samples from the Molonglo River and Queanbeyan River.

The samples were submitted by Mr M. Elliot of the Department of the Interior.

Sampling date November 1970

<u>Location</u>	<u>Point</u>	<u>pH</u>	<u>Sp. Cond.</u> <u>umho/cm</u>	<u>Zn</u> <u>ppm</u>	<u>Fe</u> <u>ppm</u>
<u>Molonglo River</u>					
8 km u/s of mine	A	7.9	44	0.01	0.01
D/s of mine	B	4.9	347	8.4	0.01
Bungendore Rd Bridge	C	7.4	252	4.4	.10
Hoskinstown Rd "	D	7.3	271	0.57	0.01
Burbong	D2	7.8	348	0.04	0.01
Sutton Rd Bridge	F	7.6	150	0.39	0.01
Duntroon Bridge	G	8.1	352	0.02	0.3
Lake Burley Griffin	H	7.7	208	0.11	3.2
<u>Queanbeyan River</u>					
Queanbeyan	E	7.4	145	0.02	0.01

Zinc Content of Molonglo River Water

by

A.D. Haldane

The following results were obtained for the determination of the zinc content of nine water samples from the Molonglo River and Queanbeyan River.

The samples were submitted by Mr M. Elliot of the Department of the Interior.

Sampling date December 1970

<u>Location</u>	Point	pH	Sp. Cond. umho/cm	Zn ppm	Fe ppm
<u>Molonglo River</u>					
8 km u/s of mine	A	7.1	44	0.12	0.20
D/s of mine	B	6.5	212	4.75	1.30
Bungendore Rd Bridge	C	7.3	178	2.22	0.50
Hoskinstown Rd "	D	7.4	189	0.41	0.50
Burbong	D2	7.4	232	0.87	0.60
Sutton Rd Bridge	F	7.5	291	0.39	0.20
Duntroon Bridge	G	7.6	145	0.04	1.30
Lake Burley Griffin	H	8.2	150	0.09	2.50
<u>Queanbeyan River</u>					
Queanbeyan	E	7.6	114	0.01	1.30

Zinc Content of Molonglo River Water

by

A.D. Haldane and P.M. Rew

The following results were obtained for the determination of zinc in five water samples collected daily from the Molonglo River. The samples were submitted by Mt M. Elliot of the Department of the Interior.

Results are given as ppm Zn.

Sample locations are as follows:

D2 - Burbong

F - Sutton Road Bridge

F2 - Honeysuckle Creek

G - Duntroon Bridge

H - Lake Burley Griffin.

Month September 1970

Date	D2	F	F2	G	H
1	3.75	1.94	0.37	0.23	0.05
2	3.85	2.12	0.41	0.35	0.05
3	4.35	2.19	0.45	0.25	0.05
4	4.50	2.19	0.41	0.45	0.05
5	4.20	2.55	0.37	0.25	0.05
6	4.20	2.33	0.43	0.37	0.05
7	4.20	2.55	0.35	0.27	0.05
8	3.85	2.55	0.48	0.27	0.05
9	3.60	2.65	0.39	0.29	0.05
10	3.5	2.75	0.33	0.29	0.05
11	3.5	2.75	0.48	0.33	0.05
12	2.95	2.75	0.48	0.31	0.08
13	2.85	3.05	0.50	0.25	0.08
14	2.09	1.91	0.20	0.13	0.02
15	1.55	1.85	0.20	0.13	0.02
16	1.96	1.74	0.20	0.13	0.04
17	1.59	1.85	0.31	0.13	0.08
18	1.64	1.91	0.25	0.13	0.02
19	1.46	1.42	0.18	0.13	0.10
20	1.46	1.30	0.15	1.10	0.13
21	1.19	0.88	0.15	0.17	0.08
22	0.86	0.43	0.10	0.08	0.12

Date	D2	F	F2	G	H
23	0.35	0.27	0.05	0.10	0.20
24	0.54	0.65	0.15	0.12	0.04
25	0.68	0.58	0.20	0.20	0.04
26					
27					
28	0.22	0.27	0.05	0.05	0.05
29	0.69	0.38	0.23	0.21	0.20
30	0.54	0.63	0.15	0.15	0.25

Month September 1970

Specific Conductance
umho/cm

1	347	348	239	264	197
2	345	360	226	255	199
3	347	370	226	245	201
4	338	372	228	239	199
5	336	377	231	243	199
6	333	378	234	241	197
7	331	380	230	236	197
8	322	279	229	234	201
9	319	380	236	236	197
10	319	378	240	231	200
11	318	377	243	237	200
12	317	380	242	235	200
13	317	382	238	237	196
14	325	390	244	236	205
15	324	388	251	248	211
16	327	373	253	261	207
17	332	370	280	260	206
18	332	371	260	256	206
19	332	370	250	255	210
20	339	360	246	255	210
21	347	362	254	252	210
22	348	332	238	258	201
23	167	162	130	134	199
24	133	143	104	108	171
25	143	144	111	105	108
26					
27					
28	140	105	84	88	170
29	118	120	100	103	100
30	131	129	107	107	132

Zinc Content of Molonglo River Water

by

P.M. Rew

The following results were obtained for the determination of zinc in five water samples collected daily from the Molonglo River. The samples were submitted by Mr M. Elliot of the Department of the Interior.

Results are given as ppm Zn.

Sample locations are as follows:

D2 - Burbong

F - Sutton Road Bridge

F2 - Honeysuckle Creek

G - Duntroon Bridge

H - Lake Burley Griffin

Month October 1970

Date	D2	F	F2	G	H
1	0.66	0.63	0.29	0.19	0.20
2	0.79	0.66	0.21	0.25	0.10
3	0.71	0.66	0.29	0.25	0.29
4	0.81	0.71	0.29	0.25	0.10
5	0.69	0.60	0.28	0.29	0.11
6	0.64	0.58	0.15	0.13	0.23
7	0.66	0.56	0.15	0.15	0.11
8	0.56	0.56	0.13	0.13	0.11
9	0.50	0.51	0.10	0.10	0.19
10	0.63	0.50	0.10	0.10	0.11
11	0.54	0.29	0.13	0.15	0.14
12	0.58	0.44	0.19	0.21	0.14
13	0.54	0.46	0.10	0.06	0.14
14	0.56	0.46	0.10	0.19	0.23
15	0.58	0.51	0.11	0.08	0.15
16	0.46	0.40	0.10	0.10	0.13
17	0.60	0.41	0.10	0.11	0.14
18	0.48	0.40	0.08	0.08	0.13
19	0.51	0.40	0.10	0.11	0.16
20	0.51	0.35	0.06	0.08	0.11
21	0.28	0.20	0.04	0.04	0.40
22	0.18	0.09	0.02	0.11	0.43

Date	D2	F	F2	G	H
23	0.22	0.43	0.04	0.01	0.20
24	0.32	0.16	0.13	0.02	0.48
25	0.28	0.11	0.02	0.04	0.30
26	0.35	0.09	0.02	0.02	0.32
27	0.20	0.09	0.02	0.04	0.13
28	0.18	0.13	0.01	0.02	0.09
29	0.13	0.09	0.01	0.02	0.11
30	0.16	0.09	0.04	0.02	0.13
31	0.20	0.11	0.09	0.04	0.13

Month October 1970

Specific Conductance
umho/cm

1	151	148	120	115	134
2	168	168	128	126	127
3	182	176	137	129	150
4	197	192	149	139	134
5	196	186	150	140	132
6	206	214	161	149	141
7	219	229	168	159	139
8	222	229	162	156	143
9	236	236	168	168	135
10	236	244	167	168	136
11	243	263	168	174	136
12	248	256	174	177	135
13	255	266	174	180	138
14	256	273	176	183	139
15	262	290	188	179	138
16	262	282	196	178	137
17	286	296	196	178	142
18	270	290	196	183	142
19	275	290	199	186	139
20	282	302	201	186	135
21	292	305	207	195	139
22	300	313	204	204	143
23	295	318	209	209	142
24	305	325	211	204	144
25	299	338	214	219	141
26	300	343	214	214	142
27	303	350	212	212	144
28	305	348	204	218	141
29	308	340	203	234	144
30	310	342	208	227	144
31	323	358	212	253	148

Zinc Content of Molonglo River Water

by

A.D. Haldane and P.M. Rew

The following results were obtained for the determination of zinc in five water samples collected daily from the Molonglo River. The samples were submitted by Mr M. Elliot of the Department of the Interior.

Results are given as ppm Zn.

Sample locations are as follows:

D2 - Burbong
F - Sutton Road Bridge
F2 - Honeysuckle Creek
G - Duntroon Bridge
H - Lake Burley Griffin

Month November 1970

Date	D2	F	F2	G	H
1	0.46	0.13	0.01	0.09	0.28
2	0.30	0.09	0.02	0.09	0.09
3	0.28	0.13	0.02	0.01	0.11
4	0.36	0.20	0.02	0.02	0.10
5	0.20	0.16	0.02	0.04	0.16
6	0.18	0.10	0.02	0.04	0.10
7	0.27	0.08	0.04	0.04	0.12
8	0.27	0.06	0.02	0.02	0.16
9	0.29	0.10	0.04	0.06	0.10
10	0.31	0.18	0.02	0.04	0.12
11	0.43	0.16	0.04	0.04	0.06
12	0.46	0.20	0.12	0.08	0.12
13	0.56	0.41	0.16	0.20	0.08
14	0.65	0.56	0.25	0.14	0.12
15	0.68	0.54	0.16	0.16	0.08
16	0.68	0.48	0.14	0.12	0.08
17	0.65	0.56	0.16	0.16	0.08
18	0.62	0.56	0.18	0.12	0.08
19	0.65	0.56	0.14	0.16	0.08
20	0.62	0.54	0.12	0.12	0.10
21	0.56	0.54	0.10	0.10	0.06
22	0.48	0.54	0.14	0.10	0.08

Date	D2	F	F2	G	H
23	0.43	0.51	0.10	0.08	0.08
24	0.29	0.36	0.06	0.06	0.11
25	0.23	0.29	0.03	0.06	0.08
26	0.23	0.11	0.05	0.05	0.08
27	0.18	0.14	0.03	0.05	0.08
28	0.36	0.18	0.05	0.05	0.08
29	0.86	0.14	0.05	0.05	0.06
30	1.06	0.20	0.05	0.05	0.05
31	-	-	-	-	-

Month November 1970

Specific Conductance
umho/cm

1	320	355	201	226	144
2	323	355	201	219	146
3	318	350	218	216	144
4	310	345	205	206	138
5	312	353	212	211	138
6	320	350	207	212	138
7	330	248	277	208	141
8	320	338	217	210	136
9	278	328	175	220	134
10	262	333	174	198	135
11	284	315	196	176	119
12	114	176	224	212	128
13	105	106	112	123	137
14	127	122	111	104	144
15	134	128	123	105	144
16	149	144	135	115	141
17	161	148	136	124	138
18	175	164	148	130	150
19	182	171	140	140	150
20	194	186	154	142	148
21	203	194	163	147	146
22	216	202	179	147	145
23	226	206	163	150	149
24	215	208	155	154	139
25	216	219	160	156	143
26	220	207	156	157	147
27	241	164	89	114	147
28	230	248	124	116	151
29	277	231	131	136	151
30	267	234	138	125	152
31					

Ringwood Evaporite Drilling, N.T.

by

C.W. Claxton and J. Weekes

Fourteen samples, taken from the core between the 478'3" and 822'6" levels, of the Bitter Springs formation Claystone, 66 miles East of Alice Springs, N.T., were submitted by A. Stewart for Boron analysis.

The results were obtained by semi-quantitative spectrographic procedures.

<u>Sample No.</u>	<u>ppm B</u>	<u>Sample No.</u>	<u>ppm B.</u>
71110019	50	71110026	160
20	100	27	100
21	160	28	160
22	160	29	200
23	160	30	200
24	160	31	160
25	160	32	160

A scan of the spectrograms revealed calcium, magnesium, aluminium, silica and sodium as major constituents with traces of iron and manganese. Very faint traces of lead, nickel, cobalt, copper and titanium were also observed.

As all results are below 200 ppm Boron, no attempt was made to obtain enrichment.

Identification of Minerals in Evaporites
from B.M.R. No. 1, Lake Amadeus N.T.

by

G.H. Berryman

9 samples from B.M.R. No. 1, Lake Amadeus, 230 km, west of Alice Springs, N.T. were submitted by P.J. Kennewell for X-ray diffraction analyses. The minerals identified, in their order of relative intensities are as follows.

<u>Sample No.</u>	<u>Depth</u>	<u>Minerals Identified</u>
70500126	13'8"	Gypsum, Quartz(tr)
70500127	78'0"	Calcite, Dolomite, Quartz.
70500144	126'0"	Gypsum
70500143	126'1"	Gypsum, Quartz, Chlorite (tr)
70500139	126'4"	Dolomite, Gypsum, Quartz
70500141	126'6"	Gypsum, Dolomite (tr) Quartz(tr)
70500138	126'7"	Dolomite, Quartz, Gypsum
70500140	126'10"	Gypsum, Quartz(tr), Chlorite(tr)
70500142	127'1"	Gypsum, Quartz(tr)

Identification of Minerals in B.M.R.
Hermannsburg No. 40.

by

G.H. Berryman

7 core samples from the B.M.R. Hermannsburg No. 40 stratigraphic drill hole, 160 km west of Alice Springs, N.T. were submitted by A.T. Wells for X-ray diffraction analyses.

The minerals identified in their order of relative intensities are given below.

<u>Sample No.</u>	<u>Depth</u>	<u>Core No.</u>	<u>Minerals Identified</u>
70500166	89'0"	6	Quartz, Kaolinite, Anatase
70500167	95'0"	7	Quartz, Kaolinite, Anatase, Muscovite.
70500168	115'6"	9	Kaolinite, Quartz, Muscovite, Anatase(tr)
70500169	130'0"	10	Quartz, Kaolinite, Muscovite, Anatase(tr)
70500170	167'0" - 182'0"	11	Quartz, Kaolinite, Anatase
70500171a	238'0"	15	Quartz, Kaolinite, Muscovite
70500172	299'6" - 300'0"	18	Quartz, Kaolinite, Muscovite

Analysis of Stream Sediments from Karimui (Lufa)

by

J. Weekes

Ten samples of stream sediments submitted by J. Bain were examined by optical emission spectrography for Cu, Mo, Au, Mn, Cr, Co, Pb, Zn, Ag, V and Ni.

Results were as follows:-

		Mn%	Cr%	Cu ppm	Mo ppm	Au	Co ppm	Pb ppm	Zn ppm	Ag	V ppm	Ni ppm
21 NG	0778	<0.16	<0.16	30	<2	a	10	10	30	a	100	10
21 NG	0800	<0.16	<0.16	10	a	a	3	<10	a	a	30	10
	0801	<0.16	<0.16	14	a	a	3	<10	a	a	24	14
	0802	<0.16	<0.16	24	<2	a	6	<10	a	a	45	14
	0803	<0.16	<0.16	24	a	a	6	<10	30	a	60	10
	0804	<0.16	<0.16	30	3	a	3	10	a	a	30	10
	0805	<0.16	<0.16	30	a	a	3	10	a	a	60	18
	0806	<0.16	<0.16	24	a	a	6	<10	30	a	60	18
	0807	<0.16	<0.16	14	a	a	6	<10	a	a	60	14
	0808	<0.16	<0.16	14	a	a	3	<10	a	a	30	14

a = Sought but not detected.

Heavy Mineral Analysis of Beach Sand
from Israelite Bay, W.A.

by

R.N. England

Summary

The sample of beach sand was found to contain about 0.03% Ti-bearing oxides. The oxides were, in the main mixed Fe-Ti oxides containing 90% or more TiO_2 . Rare grains contained more than 20% FeO, the highest being 30%.

Separation

Separation in bromoform yielded a concentrate containing large aragonite fragments (density 2.9), garnet, green hornblende, and opaque minerals. 3 samples, each of 50 grams, contained 0.4, 0.4 and 0.5% heavy minerals (including aragonite).

Modal Analysis

A modal analysis of one sample of concentrate gave the following results:

43% ARAGONITE
29% GARNET
13% GREEN HORNBLENDE (may be almost opaque in the centres of grains
in the thick sections prepared)
2% BROWN HORNBLENDE
6% OPAQUE
7% OTHERS

The concentrate would thus contain about 9-10 wt% opaques. The estimated opaque mineral content of the other two samples was 2 and 7 wt%, giving an average opaque mineral content for the whole sample of about 0.03%.

Opaque Mineral Compositions

The opaques were found to be mixed Fe oxide - Ti oxide with Ti oxide greatly predominating. A number of grains from one sample were analysed and yielded the following weights percent FeO (total Fe as FeO):

0.6
20
30
5
9
1
1
8
6
5
12

The remainders are very close to the TiO_2 wt% plus a small amount of water. Grains containing 15-20% FeO would be described by Bailey et al (1956) as amorphous iron-titanium oxide while those containing less than 5% FeO would be called leucoxene.

Conclusion

The black heavy minerals in the sample are largely green hornblende but some TiO_2 -rich mixed oxides (about 0.03%) are present.

Reference

S.W. BAILEY, E.N. CAMERON, H.R. SPEDDEN and RANDALL, J. WEEGE (1956)
The alteration of ilmenite in beach sands. Econ. Geol. Vol. 51 pp
262-279.

Identification of minerals in core
sample from B.M.R. Napperby No. 4

by

G.H. Berryman

One core sample of Tertiary sediments from the B.M.R. Napperby No. 4 stratigraphic bore hole, 50 km. east of Mr Wedge homestead in the Ngalia Basin, N.T. was submitted by A.T. Wells for x-ray diffraction analysis.

The minerals identified, in their order of relative intensities follow.

<u>Sample No.</u>	<u>Core No.</u>	<u>Depth.</u>	<u>Minerals Identified.</u>
70660041	2	316'.0"	Quartz, Illite, Kaolinite

IDENTIFICATION OF MINERALS IN CORE AND
CUTTINGS FROM B.M.R. NAPPERBY, NO.5

by

G.H. Berryman

Six core and cuttings samples from the B.M.R. No. 5 stratigraphic bore hole, 25 km north of Mt Wedge Homestead in the Ngalia Basin, N.T. were submitted by A.T. Wells for mineral identification.

The analyses were carried out by x-ray diffraction and the minerals identified, in their order of relative intensities appear in the table below.

Sample No.	Core No.	Depth	Minerals Identified
70660024	Cuttings (Washed)	70'-75'	Quartz, Feldspar, Kaolinite, Muscovite.
70660025	Cuttings	195'-210'	Quartz, Kaolinite, Calcite, Feldspar, (tr) Muscovite, (tr).
70660026	Cuttings	255'-270'	Quartz, Kaolinite, Goethite, Muscovite.
70660027	Cuttings	300'-315'	Quartz, Muscovite, Kaolinite.
70660028	Core 4	407'.6"	Quartz, Muscovite, Kaolinite.
70660044	Core 9	760'-761'3"	Quartz, Calcite, Chlorite, Muscovite, Dolomite, Feldspar.

IDENTIFICATION OF MINERALS IN CORE AND
CUTTINGS FROM B.M.R. NAPPERBY, No. 7

by

G.H. Berryman

Six core and cuttings samples from the B.M.R. Napperby No. 7 stratigraphic bore hole, 20 km south east of Napperby homestead, Ngalia Basin, N.T. were submitted by A.T. Wells for mineral identification.

The analyses were carried out by x-ray diffraction and the minerals identified, in their order of relative intensities are given in the table below.

Sample No.	Core No.	Depth	Minerals Identified
70660018	Cuttings	20'- 25'	Calcite, Quartz Feldspar, Kaolinite, (tr) Muscovite, (tr).
70660019	Cuttings	170'-175'	Quartz, Kaolinite, Muscovite, (tr) Calcite, (tr)
70660020	Cuttings(Washed)	350'-365'	Quartz, Kaolinite, Hematite, (tr)
70660020	Cuttings(Heavy Minerals)		Quartz, Hematite.
70660021	Cuttings(Washed)	470'-485'	Quartz, Kaolinite, (tr) Calcite, (tr)
70660021	Cuttings(Heavy Minerals)		Quartz, Hematite.
70660022a	Core 8.	870'	Goethite, Quartz, Kaolinite.
70660022b	" "	"	Quartz, Kaolinite, Muscovite, Goethite.

Identification of minerals in cuttings
from B.M.R. Mt Doreen, No. 15.

by

G.H. Berryman.

A sample of cuttings from the B.M.R. Mt Doreen No. 15 stratigraphic drill hole, 50 km west north west of Mt Wedge homestead, Ngalia Basin, N.T. was submitted by A.T. Wells for X-ray diffraction analysis.

The minerals identified, in their order of relative intensities follow.

<u>Sample No.</u>	<u>Depth.</u>	<u>Minerals Identified.</u>
70660039.	395'-400'	Quartz, Kaolinite, Illite (tr).

Identification of minerals in cuttings
from B.M.R. Napperby No. 6.

by

G.H. Berryman.

Nine samples of cuttings from B.M.R. Napperby No. 6, 12 km east north east of Mt Wedge homestead, Ngalia Basin, N.T. were submitted by A.T. Wells for X-ray diffraction analyses.

The minerals identified, in order of relative intensities are given in the table below.

Sample No.	Depth.	Minerals Identified.
70660030.	15'-20'.	Gypsum, Quartz, Kaolinite, Feldspar (tr).
70660031.	55'-60'.	Quartz, Kaolinite, Gypsum, Muscovite, Feldspar, (tr).
70660032.	160'-165'.	(washed) Kaolinite, Quartz, Muscovite.
70660033.	170'-175'.	Kaolinite, Muscovite, Quartz.
70660034.	175'-180'.	(washed fines) Quartz, Kaolinite, Muscovite.
70660035.	230'-235'.	Kaolinite, Muscovite, Quartz, Halite.
70660036.	235'-240'.	Kaolinite, Muscovite, Quartz, Halite (tr).
70660037.	240'-245'.	Kaolinite, Muscovite, Quartz.
70660038.	350'-355'.	(heavy minerals) Quartz, Pyrite.
70660038.	" "	(washed-black grains) Quartz, Pyrite, Muscovite, Kaolinite.
70660038.	" "	(washed-white grains) Muscovite, Kaolinite, Quartz.
70660038.	" "	(washed-red grains) Quartz, Kaolinite, Muscovite, Feldspar (tr).

Identification of minerals in cuttings
From B.M.R. Mt Doreen, No. 13.

by

G.H. Berryman.

One sample of cuttings from the B.M.R. Mt Doreen, No. 13, stratigraphic drill hole, 20 km south east of Yuendumu native settlement, Ngalia Basin, N.T. was submitted by A.T. Wells for X-ray diffraction analysis.

Analyses were carried out on both the white and blackish-grey sections of the sample and the minerals identified, in order of relative intensities appear in the table below.

Sample No.	Depth.	Section.	Minerals Identified.
70660042.	400'-401'6"	White,	Quartz, Kaolinite, Muscovite, Feldspar.
70660042.	" "	Blackish-grey,	Dolomite, Quartz, Muscovite, Chlorite, Feldspar (tr)

Identification of minerals in a core
sample from B.M.R. Mt Doreen No. 11.

by

G.H. Berryman

A core sample from B.M.R. Mt Doreen No. 11 stratigraphic bore hole, 50 km west north west of Mt Wedge homestead, Ngalia Basin, N.T. was submitted by A.T. Wells for X-ray diffraction analysis.

The minerals identified, in their order of relative intensities follow.

<u>Sample No.</u>	<u>Core No.</u>	<u>Depth.</u>	<u>Minerals.</u>
70660040.	Core 1.	483'.0"	Quartz, Illite, Calcite, Kaolinite.

Identification of minerals in drill
cuttings from B.M.R. Alcoota No. 1.

by

G.H. Berryman.

A sample of cuttings from B.M.R. Alcoota No. 1, 120 km north east of Alice Springs, N.T. was submitted by B.R. Senior for X-ray diffraction analysis.

The minerals identified, in order of relative intensities follow.

<u>Sample No.</u>	<u>Depth.</u>	<u>Minerals.</u>
70091133.	320'-330'	Calcite, Quartz, Kaolinite, Dolomite (tr).

Identification of minerals in evaporites
from B.M.R. Alice Springs No. 3 (Ringwood)

by

G.H. Berryman

Twenty six core samples from the B.M.R. Alice Springs No. 3 (Ringwood) drill hole 106 km east of Alice Springs, N.T., were submitted by A.J. Stewart for X-ray diffraction analyses.

The minerals identified, in order of relative intensities are given in the table below:

Sample No.	Depth	Minerals Identified
71110044	230'0" - 230'2"	Gypsum, Dolomite Quartz, Chlorite
71110045	230'6" - 230'8"	Gypsum, Quartz(tr), Dolomite(tr)
71110046	231'0" - 231'2"	Gypsum, Dolomite, Quartz(tr), Chlorite(tr)
71110047	231'6" - 231'8"	Gypsum, Dolomite, Chlorite, Quartz
71110048	232'0" - 232'2"	Gypsum, Dolomite, Quartz(tr) Chlorite(tr)
71110049	232'6" - 232'8"	Gypsum, Dolomite, Quartz(tr), Chlorite(tr)
71110050	233'0" - 233'2"	Gypsum, Quartz, Dolomite(tr), Chlorite(tr)
71110051	233'6" - 233'8"	Gypsum, Quartz(tr), Chlorite(tr), Dolomite(tr)
71110052	234'0" - 234'2"	Gypsum, Dolomite, Quartz, Chlorite
71110053	234'6" - 234'8"	Gypsum, Dolomite, Quartz, Chlorite
71110054	235'0" - 235'2"	Gypsum, Dolomite, Quartz, Chlorite
71110055	235'6" - 235'8"	Gypsum, Dolomite, Quartz, Chlorite
71110056	236'0" - 236'2"	Gypsum, Dolomite, Chlorite, Quartz(tr)
71110057	236'6" - 236'8"	Gypsum, Dolomite, Chlorite(tr), Quartz(tr)

Continued

Sample No.	Depth	Minerals Identified
71110058	237'0" - 237'2"	Gypsum, Dolomite, Quartz, Chlorite(tr)
71110059	237'6" - 237'8"	Gypsum, Dolomite, Quartz(tr)
71110060	238'0" - 238'2"	Gypsum, Dolomite, Chlorite(tr), Quartz(tr)
71110061	238'6" - 238'8"	Gypsum, Dolomite, Quartz(tr)
71110062	239'0" - 239'2"	Gypsum, Dolomite, Quartz(tr)
71110063	239'6" - 239'8"	Gypsum, Dolomite, Quartz, Chlorite, Muscovite
71110064	240'0" - 240'2"	Gypsum, Quartz, Dolomite, Chlorite(tr)
71110065	143'0"	Dolomite, Quartz, Chlorite, Gypsum(tr), Muscovite(tr)
71110066	326'0"	Dolomite, Quartz, Gypsum, Chlorite, Muscovite(tr)
71110067	329'0"	Dolomite, Gypsum, Quartz, Chlorite, Muscovite(tr)
71110068	480'0"	Gypsum, Dolomite, Quartz, Chlorite, Muscovite(tr)
71110069	822'0"	Dolomite, Gypsum, Quartz, Chlorite, Muscovite(tr)

The use of X-ray diffraction as a means
of detecting counterfeit coins

by

G.H. Berryman and S.E. Smith

Six gold coins (four genuine sovereigns, one genuine U.S.\$20, and one counterfeit U.S.\$20) were submitted by Mr F.J. Sare of the Royal Australian Mint to see if X-ray diffraction could be used as a means of detecting counterfeit coins.

The diffraction patterns obtained from the sovereigns were similar, suggesting that little variation would be found in the patterns of genuine coins. The patterns of the sovereigns were similar to that of gold in the index to the Powder Diffraction file, 1968, No.4-0784, published by the American Society for Testing and Materials, except that the positions of the peaks had been displaced slightly, giving an upwards shift of 0.045 Å at 2.31 Å, to about 0.022 Å at 1.21 Å. This shift could be due to a slight deformation of the crystal lattice of the metal during minting.

The patterns obtained from the two U.S.\$20 coins showed a marked contrast. The genuine coin produced a pattern with sharp peaks resembling that of the sovereigns where as the counterfeit coin had a more diffused pattern with broader and less intense peaks. The differences in the patterns probably suggest that two different methods were used in the manufacture of these coins.

Gold was the only material that could be positively identified in the counterfeit coin. However as the genuine coin in this case has a collector's value far in excess of its gold content, the counterfeit coin was made with the idea of deceiving the collector rather than profitting from diluting gold with a base metal.

Thus it would appear that X-ray diffraction may prove to be a useful tool in the detection of counterfeit coins. Certainly it can detect base metals that have been used to dilute the coinage metal, but so too can other methods, such as X-ray fluorescence. However, if X-ray diffraction can be used to recognize differences in minting procedures as well it will become an invaluable technique for detecting counterfeits. Further work would have to be carried out on both genuine and counterfeit coins before this method is proved.

Identification of Minerals in Evaporites
from B.M.R. Mt Liebig No. 1.

by

G.H. Berryman

Four samples from B.M.R. Mt Liebig No. 1, 210 km west of Alice Springs, N.T., were submitted by P.J. Kennewell for mineral identification.

The analyses were carried out by X-ray diffraction and the identified minerals, in their order of relative intensities appear in the table below.

<u>Sample No.</u>	<u>Depth</u>	<u>Minerals Identified</u>
70500270	300'2"	Anhydrite, Dolomite, Quartz, Chlorite, Muscovite(tr)
70500269	305'11"	Anhydrite, Halite, Dolomite, Quartz, Chlorite(tr)
70500271	350'3"	Anhydrite, Halite, Quartz, Dolomite, Chlorite
70500268	400'11"	Anhydrite, Quartz, Halite, Chlorite, Dolomite(tr)

Identification of minerals in evaporites
from B.M.R. Lake Amadeus No. 3b.

by

G.H. Berryman.

15 samples from the B.M.R. Lake Amadeus No. 3b stratigraphic drill hole 230 km west of Alice Springs, N.T. were submitted by P.J. Kennewell for mineral identification.

The analyses were carried out by X-ray diffraction, and the minerals identified appear in the table below.

<u>Sample No.</u>	<u>Depth.</u>	<u>Minerals.</u>
70500285	0'.10"	Quartz, Chlorite (tr), Kaolinite (tr).
70500254	216'. 8"	Gypsum, Dolomite, Quartz (tr).
70500255	223'. 8"	Gypsum, Quartz, Dolomite.
70500256	278'. 9"	Dolomite, Quartz (tr), Gypsum (tr), Chlorite (tr).
70500257	292'. 0"	Gypsum, Dolomite, Quartz, Chlorite (tr).
70500258	412'. 2"	Dolomite, Gypsum, Quartz (tr).
70500259	412'. 9"	Dolomite, Quartz, Gypsum (tr), Chlorite (tr) Muscovite (tr).
70500260	493'.10"	(Total rock) Gypsum, Quartz, Chlorite, Muscovite, Dolomite.
70500261	493'.10"	(Brown claystone) Quartz, Dolomite, Hematite, Chlorite, Muscovite, Halite (tr).
70500262	493'.10"	(White prismatic veins) Gypsum.
70500263	493'.10"	(Grey-Green Siltstone) Dolomite, Quartz, Gypsum, Feldspar, Chlorite, Muscovite.
70500264	509'. 2"	Gypsum, Quartz (tr).
70500265	554'. 9"	Gypsum, Dolomite, Quartz (tr).
70500266	745'. 0"	Gypsum, Dolomite, Quartz, Chlorite (tr) Muscovite (tr), Feldspar (tr).
70500267	994'. 4"	Gypsum, Dolomite, Anhydrite, Quartz (tr)

Spectrographic Analysis of Gossan Sample

by

J. Weekes

A sample of gossan, regd no. 70099668 was submitted by Miss R. G. Warren for analysis for Pb, Ba, Cu, Au, Zn & Ag. The sample was separated into four physically dissimilar parts, each examined by semi-quantitative spectrographic analysis over the wavelength range 8,000 - 2,480 Å.

Results in ppm, were:-

	Pb	Ba	Sr	Cu	Au	Zn	Ag	B
A	90	P	P	20	a	a	a	a
B	30	P	P	20	a	a	a	a
C	20	P	P	2	a	a	a	1000
D	a	P	P	20	a	a	a	a

P = present, in trace amount.

a = sought, but not detected.

Identification of minerals in core
samples from B.M.R. Napperby No. 6

by

G.H. Berryman

Two core samples from the B.M.R. Napperby No. 6 stratigraphic drill hole 12 km east north east of Mr. Wedge home-
stead, Ngalia Basin, N.T. were submitted by A.T. Wells for
mineral identification.

The analyses were carried out by x-ray diffraction,
and the minerals identified in their order of relative intens-
ities follow.

Sample No.	Depth	Minerals Identified.
70500287	350'.0" (Core 1.)	Quartz, Kaolinite, Muscovite, Feldspar (tr).
70500288	355'.0" (Core 1.)	Muscovite Kaolinite, Quartz, Hematite, Feldspar (tr).

3 March, 1971

Identification of elemental silicon in samples from
New Britain and Australian Capital Territory

by

G.H. Berryman, R.N. England and S.E. Smith

Recently three different samples of a light silvery metal were submitted for identification by x-ray diffraction analyses. The samples are No. 70690004 from Ewassi near Hoskins in New Britain, submitted by Mr. A. Renwick. (Department of Lands, Surveys and Mines, T.P.N.G.). No. 70710020 from the Rabaul area, New Britain, submitted by Mr. W. D. Palfreyman, (Rabaul Observatory, Department of Lands, Surveys and Mines, T.P.N.G), and an unlabelled specimen from Ainslie, A.C.T., submitted by Mr. T. Zapaznik, B.M.R.

The x-ray diffraction patterns for all three samples suggest they are silicon metal. (Pattern 5-565, A.S.T.M. Powder Diffraction File, 1968).

Sample No. 70690004 was analysed for Si on the electron probe micro analyser using a quartz standard for comparison.

Difficulties were encountered because of the shift in position of the $K\alpha$ peak between specimen and standard but the analysis showed that the sample contained at least 95% Si.

This confirms that the material was elemental silicon, the natural occurrence of which is highly unlikely. Unfortunately only vague information is available as to the mode of occurrence of the three specimens.

Some Aspects of the Mineralogy of 3 Specimens of
Lamprophyre from Beaver Lake, Antarctica

by R.N. England

Quantitative electron probe analyses of olivine, semiquantitative partial Analyses of biotite and optical and qualitative microprobe identification of nepheline in biotite-rich lamprophyres from Beaver Lake, Antarctica are reported.

OLIVINE

Sample 69280071

The olivine composition of one large phenocryst is Fo_{88} in both rim and core. Two groundmass olivines were also Fo_{88} . Analyses of core and rim of one corroded and embayed olivine phenocryst showed the core to be Fo_{72-75} and the rim Fo_{84-87} .

Sample 69280152

Zoning was not pronounced in phenocryst or ground mass olivine. Random analyses of grains yielded the following compositions:

Fo_{88} , 82.5, 87, 88, 86, 88.5

Sample 6980334

Both normal and reverse zoning from Fo_{81} to Fo_{88} were detected in two grains. Random analyses of groundmass and phenocryst olivine yielded the following composition Fo_{88} , 89, 89, 88

BIOTITE (phlogopite)

Random total Fe as FeO determinations were made on a number of biotite grains in each sample.

Sample	Total Fe as FeO
71	11.5, 12.4
152	8.0, 7.1, 8.5, 8.4
334	10.0, 9.0, 10.4

NEPHELINE

Nepheline occurs in Samples 152 and 334 as subhedral to anhedral grains with quite high negative relief due to the comparatively high refractive index of nearly all the surrounding minerals. Measured refractive indices of the nepheline were $n=1.549$ and $o=1.545$.

A secondary mineral, or mixture of phases with a slightly higher refractive index than nepheline and bluish grey first order interference colours contains Ca, Si, Al, Mg and Fe as major elements. Oxide minerals are perovskite and ilmenite. Some pyrite is also present but is probably secondary.

Laboratory Report No. 46

15 March, 1971

Identification of Minerals in an
Unlabelled Specimen from Broken Hill, N.S.W.

by

G.H. Berryman

An unlabelled specimen from Broken Hill, N.S.W. was submitted by P.C. Tonkin for mineral identification.

The analysis was carried out by X-ray diffraction, the minerals identified being siderite and goethite.

Laboratory Report No. 47

15 March, 1971

Identification of Minerals in Cuttings
from B.M.R. Lake Amadeus No. 3b

by

G.H. Berryman

A sample of cuttings from B.M.R. Lake Amadeus No. 3b, 230 km west of Alice Springs, N.T. was submitted by P.J. Kennewell for mineral identification.

The analysis was carried out by X-ray diffraction, and the minerals identified, in their order of relative intensities appear in the table below.

<u>Sample No.</u>	<u>Depth</u>	<u>Minerals Identified</u>
70500289	40'-50'	Quartz, Gypsum, Kaolinite, Muscovite

18 March, 1971.

Identification of minerals in breccia
samples from Mt Liebig. N.T.

by

G.H. Berryman

Two samples of breccia from an outcrop at Mt Liebig, 210km west of Alice Springs, N.T. were submitted by P.J. Kennewell for mineral identification.

The analyses were carried out by X-ray diffraction and the minerals identified, in order of relative intensities appear below.

<u>Sample No.</u>	<u>Minerals</u>	<u>Identified</u>
70500290	Quartz, Dolomite,	Calcite (tr)
70500291	Calcite, Dolomite, Quartz,	Chlorite (tr)

Laboratory Report No. 49

30 March, 1971

Identification of Minerals in Evaporite
Sample from B.M.R. Mt Liebig No. 1

by

G.H. Berryman

One evaporite sample from the B.M.R. Mt Liebig No. 1 stratigraphic drill hole 210 km west of Alice Springs, N.T., was submitted by P.J. Kennewell for mineral identification.

The analysis was carried out by X-ray diffraction and the minerals identified, in their order of relative intensities appear below.

Sample No.	Depth	Minerals Identified
70500202	16'6"	Dolomite, Quartz, Gypsum, Chlorite

Identification of Minerals in Dredge
Samples from near Port Macquarie, N.S.W.

by

G.H. Berryman

Three marine samples dredged from 241 meters 50 km northeast of Port Macquarie, N.S.W., were submitted by J.E. Marshall for mineral identification.

The analyses were carried out by X-ray diffraction and the minerals identified, in their order of relative intensities are given in the table below.

Sample No.	Minerals Identified
70631516	Quartz, Calcite, Goethite, Aragonite (tr)
70631516a	Quartz, Goethite, Glauconite, Feldspar (tr) Calcite(tr)
70631516b	Goethite, Quartz, Calcite.

Laboratory Report No. 51

1 April, 1971

Identification of Minerals in Evaporite
sample from B.M.R., Lake Amadeus No. 3b

by

G.H. Berryman

One sample from B.M.R. Lake Amadeus No. 3b, 230 km west of Alice Springs, N.T., was analysed by X-ray diffraction for P.J. Kennewell.

The minerals identified, in their order of relative intensities are given in the table below.

<u>Sample No.</u>	<u>Depth</u>	<u>Minerals Identified</u>
70500293	853'5"	Anhydrite, Quartz, Dolomite

Identification of Minerals in an Evaporite

Sample from B.M.R. Ringwood, No. 3

by

G.H. Berryman

One sample from B.M.R. Ringwood No. 3, 106 km east of Alice Springs, N.T., was submitted by A.J. Stewart for mineral identification.

The analysis was carried out by X-ray diffraction and the following minerals, in their order of relative intensities were identified.

Sample No. 71110001 Gypsum, Quartz(tr) Bassanite(tr)

Identification of Minerals in Gneisses
from Antarctica.

by

G.H. Berryman

Two samples from the Australian Antarctic Territory were submitted by R.M. Hill for mineral identification.

The analyses were carried out by X-ray diffraction and the minerals identified, in their order of relative intensities are given in the table below.

<u>Sample No.</u>	<u>Location</u>	<u>Section</u>	<u>Minerals Identified</u>
71280212	Mt McMahon	Black mineral	Plagioclase, Spinel, Quartz(tr)
71280220a	Moore Pyramid	Black mineral	Chlorite, Prehnite, Quartz(tr), Calcite(tr)
71280220b	" "	Green powder	Chlorite, Calcite, Quartz, Feldspar.

Spectrographic Analysis of Halite samples from Mount Liebig.

by

J. Weekes.

Samples of Halite from B.M.R. No. 1 bore, Mount Liebig, were submitted by A. Wells. They were examined by semi-quantitative spectrographic analysis over the wavelength range 8000 - 2480 Å⁰.

Results, expressed in ppm, were:-

	K	Ba	Sr	Mn	B
70500025	13,000	100	60	65	100
29	4,250	50	80	20	300
32	13,000	100	50	6	100
43	10,000	75	10	120	300
52	2,500	2	50	2	10
58	2,500	2	40	2	5
61	1,000	2	50	2	5
64	2,500	2	40	2	5
69	1,500	5	40	2	15
71	1,500	2	40	2	50

Spectrographic Analysis of Gypsum samples from Lake Amadeus.

by

J. Weekes.

Samples of gypsum from Lake Amadeus 3B Stratigraphic hole were submitted by A. Wells. They were examined by semi-quantitative spectrographic analysis over the wavelength range 8,000 - 2480Å^o

Results, expressed in ppm, were:-

	K	Ba	Sr	Mn	B	ppm
70500217	650	10	100	65	100	
18	1,400	10	100	65	165	
19	650	7	200	65	165	
220	1,400	30	100	130	230	
21	1,400	7	200	40	230	
22	1,400	10	100	65	165	
23	650	10	100	20	100	
24	10,000	30	60	130	500	
25	650	3	300	65	300	
26	1,400	200	600	65	230	
27	400	3	300	40	165	
28	2,000	7	60	130	500	
29	20,000	200	200	40	300	
230	1,400	70	200	65	230	
31	2,000	70	100	130	500	
32	1,400	7	200	40	230	
33	650	7	100	20	300	
34	1,400	7	200	40	300	
35	1,400	10	300	65	300	
36	2,000	10	300	65	500	
37	2,000	10	300	20	100	
38	1,400	10	100	65	500	
39	650	7	60	65	165	
240	20,000	200	20	65	500	
41	2,000	7	200	65	230	
42	1,400	10	200	20	30	
43	200	10	600	20	50	
44	200	7	600	40	165	
45	650	7	600	20	230	
46	400	3	300	20	100	
47	400	1	300	20	10	
48	200	a	300	20	10	
49	200	a	600	<2	< 10	
250	400	3	300	40	30	
51	650	3	200	40	30	
52	<200	3	200	200	30	
53	200	3	600	20	100	

Spectrographic Analysis of Julia Creek Oil Shale

Core samples

by J. Weekes

Four core samples submitted by F. Douth were examined by semiquantitative spectrographic analysis for Mo and V, and the plate scanned for other elements of interest.

		Mo ppm	V ppm
Sample No	1	25	300
	2	20	250
	3	20	300
	4	25	250

The following elements were found to be present in average trace amounts

1. B, Mn, Mg, Fe, Ti, Cu, Ni.
2. B, Mn, Mg, Fe, Ti, Cu, Ni.
3. B, Mn, Pb, Mg, Fe, Ti, Cu, Na, Ni, Co.
4. B, Mn, Pb, Mg, Fe, Ti, Cu, Na, Ni, Co.

Identification of Minerals in Evaporites from Ringwood, N.T.

by

G.H. Berryman.

Three samples from the B.M.R. Ringwood evaporite drilling site, 66 miles east of Alice Springs, N.T. were submitted by A.J. Stewart for mineral identification.

The analyses were carried out by X-ray diffraction and the minerals identified, are listed in order of relative intensities in the table below.

<u>Sample No.</u>	<u>Minerals Identified.</u>
71110016. a.	Gypsum, Anhydrite, Quartz, Bassanite.
71110016. b.	Gypsum, Quartz, Anhydrite(tr).
71110034.	Bassanite.

Laboratory Report No. 58.

21 April, 1971.

Identification of Phosphate minerals from Broken Hill.

by

G.H. Berryman.

Three samples from the Broken Hill area, N.S.W. were submitted by P.C. Tonkin for X-ray diffraction analyses.

The minerals identified in order of relative intensities are listed below.

<u>Sample.</u>	<u>Minerals.</u>
T.C. 1	Fluorapatite.
T.C. 2	Fluorapatite.
L.B. 1	Muscovite, Chlorite(tr).

ANALYSES OF LIMESTONES FROM MARRABA1:100,000 SHEET AREA, N.W. QUEENSLAND.

by

S.E. Smith and T.I. Slezak

Sixteen samples of limestones from the Marraba 1:100,000 Sheet area, N.W. Queensland, submitted by G.M. Derrick, were analysed by optical emission spectroscopy on the Hilger and Watts 3 metre Polychromator for Ba, Co, Cu, Fe, La, Mg, Mn, Ni, Sc, Sr, Ti, V, Y and Zr. The samples were ignited at 1000°C for 4 hours.

The analytical method used was adapted from Ahrens and Taylor ("Spectrochemical Analysis", 1961, p.189, Addison - Wesley Publishing Company). One part of sample was mixed with two parts of graphite (National Carbon Company Type L4160, Grade SP-2). The mix was loaded into a preformed graphite electrode (National Carbon Company Type L4206) and arced as the anode at a constant 8 amps D.C. for 130 seconds. Both internal standard and rock standard control were used.

Sample No.	Ba (ppm)	Co (ppm)	Cu (ppm)	Fe (%)	La (ppm)	Mg (%)	Mn (%)	Ni (ppm)
70200337	57	18	11	0.6	143	0.7	+0.21	18
38	-50	6	11	1.1	-70	+3.5	+0.21	7
39	-50	11	9	0.5	91	0.2	+0.21	10
40	2162	6	8	0.9	-70	3.4	0.13	8
41	87	7	11	0.9	80	3.0	+0.21	10
42	-50	46	+250	2.5	-70	+3.5	+0.21	8
43	-50	+175	+250	4.5	71	+3.5	+0.21	90
44	-50	48	104	1.5	-70	1.1	0.14	20
45	-50	15	9	1.0	112	1.4	0.18	13
46	-50	8	9	0.6	81	0.2	+0.21	10
47	-50	7	16	2.8	-70	+3.5	+0.21	5
48	560	8	19	1.4	-70	0.4	+0.21	9
49	220	12	35	0.6	105	0.4	+0.21	11
50	-50	+175	+250	8.8	89	-0.2	0.07	375
51	-50	23	+250	1.0	109	0.2	0.19	17
52	-50	+175	+250	9.0	119	0.8	0.09	+900

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)	Loss on ignition (%)
70200337	92	530	-0.04	43	143	-100	42.7
38	36	28	-0.04	14	62	-100	43.8
39	24	190	-0.04	28	43	-100	42.6
40	7	510	0.07	18	9	-100	34.5
41	11	70	0.11	33	17	-100	27.5
42	18	-20	-0.04	84	13	-100	44.2
43	16	26	0.04	25	97	-100	35.4
44	43	83	0.27	21	37	-100	30.8
45	24	270	0.07	38	36	-100	40.1
46	70	280	-0.04	26	99	-100	41.8
47	7	36	0.04	16	18	-100	42.3
48	10	110	0.09	19	26	237	25.9
49	23	390	-0.04	56	87	-100	38.2
50	17	88	-0.04	21	54	-100	6.6
51	26	185	-0.04	29	103	-100	42.7
52	12	150	-0.04	18	95	-100	4.7

Note:- The results are on the basis of unignited material.

IDENTIFICATION OF MINERALS IN METAMORPHOSED LIMESTONES AND BASALTS
FROM THE SUCKLING-DAYMAN MOUNTAIN BLOCK, T.P.N.G.

by

G.H. Berryman and S.E. Smith

One hundred and twenty-six (126) samples from the Suckling-Dayman Mountain block, Eastern Papua, T.P.N.G., were submitted by H.L. Davies for mineral identification by X-ray diffraction.

The minerals identified were determined by comparison with standard diffraction patterns in the 1968 A.S.T.M. index, and are listed in order of relative intensities in the table below. Positive identification of the minerals listed as serpentine and amphibolite could not be made, although the patterns suggest that the serpentine mineral is antigorite and the amphibole either tremolite or actinolite.

<u>65521703</u>	<u>65521713</u>	<u>65521714</u>	<u>65521715</u>	<u>65521716</u>
calcite	calcite	calcite	calcite	calcite
quartz	quartz	quartz	quartz	quartz
muscovite	chlorite	chlorite	chlorite	feldspar
chlorite(tr).	feldspar	feldspar(tr).	feldspar	chlorite(tr).
	muscovite(tr).	muscovite(tr).	muscovite(tr).	muscovite(tr).
				amphibole(tr).
<u>65521745</u>	<u>65521747</u>	<u>65521751</u>	<u>65521752C</u>	<u>65521754</u>
muscovite	calcite	quartz	calcite	calcite
quartz	quartz	diopside	quartz	quartz
chlorite	muscovite(tr)	prehnite	chlorite(tr)	feldspar(tr).
feldspar	chlorite(tr)	feldspar(tr)	feldspar(tr)	chlorite(tr).
epidote(tr)				
<u>65521755</u>	<u>65521756</u>	<u>65521757</u>	<u>65521766</u>	<u>65521767</u>
calcite	calcite	calcite	calcite	stilpnomelane
quartz	quartz	quartz(tr)	muscovite	phlogopite
chlorite	muscovite(tr)	feldspar(tr)	quartz	feldspar
muscovite	feldspar(tr)	chlorite(tr)	chlorite	chlorite
feldspar(tr)		muscovite(tr)	feldspar	amphibole
				epidote
<u>65521768</u>	<u>65521772</u>	<u>65521773</u>	<u>65521797</u>	<u>65521798</u>
quartz	muscovite	chlorite	calcite	calcite
stilpnomelane	chlorite	calcite	quartz	muscovite
feldspar	quartz	quartz	chlorite(tr)	chlorite
chlorite	calcite	feldspar	muscovite(tr)	quartz(tr)
calcite	feldspar(tr)	stilpnomelane	feldspar(tr)	feldspar(tr)
amphibole		muscovite		
muscovite(tr)				

<u>65521799</u>	<u>65521802</u>	<u>65521803</u>	<u>65521805</u>	<u>65521825</u>
quartz chlorite feldspar amphibole calcite	calcite quartz chlorite feldspar(tr) muscovite(tr)	calcite quartz feldspar chlorite(tr) muscovite(tr)	chlorite dolomite quartz feldspar muscovite(tr)	calcite quartz feldspar chlorite muscovite
<u>65521826</u>	<u>65521827</u>	<u>65521832</u>	<u>65521833</u>	<u>65521833(m)¹</u>
calcite quartz feldspar(tr) chlorite(tr) muscovite(tr)	calcite quartz chlorite feldspar muscovite	quartz calcite feldspar epidote muscovite chlorite	phlogopite calcite feldspar epidote magnetite(tr)	phlogopite feldspar calcite magnetite epidote
<u>65521838</u>	<u>65521842</u>	<u>65521844</u>	<u>65521846</u>	<u>65521861a</u>
muscovite calcite chlorite quartz feldspar	quartz calcite(tr) amphibole(tr) feldspar(tr) chlorite(tr)	chlorite feldspar diopside muscovite quartz amphibole(tr) pumpellyite (tr) prehnite (tr) epidote (tr)	quartz calcite chlorite muscovite feldspar(tr)	green material feldspar quartz chlorite
<u>65521861b</u>	<u>65521866</u>	<u>65521869</u>	<u>65521873</u>	<u>65521875</u>
black material quartz feldspar chlorite muscovite	calcite chlorite quartz feldspar epidote muscovite amphibole(tr)	chlorite calcite muscovite quartz feldspar	quartz amphibole chlorite pumpellyite calcite epidote(tr) muscovite(tr) feldspar(tr)	forsterite serpentine enstatite
<u>65521876</u>	<u>65521891</u>	<u>65521896</u>	<u>65521898</u>	<u>65521961</u>
serpentine forsterite	calcite quartz aragonite chlorite(tr)	quartz calcite aragonite pumpellyite chlorite(tr) feldspar(tr)	calcite quartz chlorite feldspar(tr)	white material cerolite* serpentine chlorite forsterite(tr)
<u>65521961</u>	<u>65521961</u>	<u>65521965</u>	<u>65521975</u>	<u>65521975</u>
green nodule chlorite epidote amphibole diopside	brown nodule serpentine forsterite	serpentine chlorite(tr)	amphibole natrolite serpentine	black nodule serpentine

<u>65521975</u>	<u>65521975</u>	<u>65521976</u>	<u>65521986</u>	<u>65521987</u>
grey powder amphibole	rim of nodule amphibole natrolite	serpentine forsterite	muscovite quartz calcite chlorite	muscovite quartz dolomite magnesite chlorite(tr)
<u>65521988</u>	<u>65521996</u>	<u>65521997</u>	<u>65521998</u>	<u>68522006</u>
magnesite quartz dolomite muscovite chlorite(tr)	quartz calcite chlorite muscovite(tr) dolomite(tr)	calcite quartz chlorite muscovite(tr) feldspar(tr)	quartz calcite feldspar chlorite muscovite	calcite quartz muscovite chlorite feldspar
<u>68522320</u>	<u>68522331</u>	<u>68522442</u>	<u>68522442</u>	<u>68522443</u>
quartz muscovite chlorite epidote feldspar(tr)	magnesite quartz tridymite**	red material quartz feldspar calcite hematite chlorite diopside(tr)	black material amphibole diopside chlorite feldspar hematite	quartz chlorite feldspar muscovite epidote
<u>68522445</u>	<u>68522445</u>	<u>68522495</u>	<u>68522499</u>	<u>68522506</u>
red material magnesite tridymite** quartz	yellow mat- erial magnesite tridymite**	chlorite calcite feldspar quartz	chlorite calcite quartz feldspar	feldspar chlorite diopside quartz prehnite(tr)
<u>68522514</u>	<u>68522516</u>	<u>68522517</u>	<u>68522522a</u>	<u>68522523</u>
feldspar chlorite amphibole epidote muscovite pumpellyite (tr)	chlorite feldspar quartz pumpellyite (tr) epidote(tr) muscovite(tr)	feldspar amphibole chlorite pumpellyite epidote(tr) muscovite(tr)	amphibole quartz feldspar pumpellyite chlorite	chlorite quartz feldspar pumpellyite amphibole muscovite(tr)
<u>68522530</u>	<u>68522532</u>	<u>68522533a</u>	<u>68522534</u>	<u>68522538</u>
chlorite amphibole quartz feldspar pumpellyite sphene(tr)	chlorite amphibole feldspar pumpellyite quartz(tr) muscovite(tr)	calcite quartz chlorite muscovite feldspar(tr)	calcite quartz chlorite muscovite feldspar(tr)	quartz calcite chlorite muscovite aragonite feldspar

<u>68522539</u>	<u>68522541x</u>	<u>68522541y</u>	<u>68522541z</u>	<u>68522545</u>
calcite aragonite quartz feldspar chlorite	feldspar chlorite calcite epidote muscovite quartz amphibole	quartz stilpnomelane chlorite epidote amphibole feldspar	quartz chlorite epidote amphibole feldspar muscovite	quartz chlorite feldspar muscovite
<u>68522554</u>	<u>68522555</u>	<u>68522558</u>	<u>68522559</u>	<u>68522560</u>
quartz chlorite feldspar calcite muscovite stilpnomelane (tr) aragonite(tr) amphibole(tr)	quartz feldspar chlorite aragonite stilpnomelane (tr) muscovite(tr) calcite(tr)	quartz calcite chlorite feldspar(tr) aragonite (tr)	quartz calcite chlorite muscovite feldspar aragonite	quartz chlorite calcite muscovite feldspar(tr)
<u>68522592</u>	<u>68522635</u>	<u>68522636</u>	<u>68523189</u>	<u>68523190</u>
quartz calcite chlorite aragonite feldspar muscovite	quartz calcite chlorite stilpnomelane feldspar amphibole epidote(tr)	calcite quartz chlorite muscovite(tr) feldspar(tr)	feldspar chlorite diopside prehnite	quartz feldspar chlorite amphibole pumpellyite(tr) prehnite(tr)
<u>68523193</u>	<u>68523197</u>	<u>68523199</u>	<u>68523202</u>	<u>68523205a</u>
chlorite quartz feldspar diopside epidote(tr)	quartz calcite chlorite muscovite feldspar	quartz calcite muscovite chlorite feldspar(tr)	chlorite feldspar diopside quartz amphibole pumpellyite (tr)	calcite quartz muscovite chlorite
<u>68523205b</u>	<u>68523210b</u>	<u>68523215</u>	<u>68523217a</u>	<u>68523217b(1)</u>
feldspar	calcite feldspar chlorite quartz epidote(tr)	quartz amphibole chlorite feldspar calcite epidote	feldspar chlorite amphibole quartz pumpellyite (tr) prehnite(tr)	datolite*** quartz calcite(tr)

<u>68523217b(2)</u>	<u>68523218</u>	<u>68523224</u>	<u>68523226</u>	<u>68523227</u>
quartz hibschite calcite	quartz chlorite feldspar muscovite calcite prehnite	calcite quartz muscovite feldspar(tr)	feldspar chlorite quartz pumpellyite epidote(tr) diopside(tr)	calcite quartz diopside feldspar
<u>68523249</u>	<u>68524352</u>	<u>68524360</u>	<u>68524367</u>	<u>68524377</u>
calcite quartz chlorite feldspar(tr) epidote(tr)	quartz calcite chlorite muscovite feldspar	chlorite feldspar epidote(tr) diopside(tr) amphibole(tr)	chlorite feldspar epidote diopside quartz	feldspar chlorite epidote diopside quartz
<u>68524379</u>	<u>68525111</u>	<u>68525113</u>	<u>68525119</u>	<u>68525120</u>
hibschite quartz prehnite calcite	chlorite feldspar calcite quartz epidote	diopside feldspar chlorite epidote(tr)	chlorite calcite quartz feldspar muscovite	red material magnesite tridymite**
<u>68525120</u>	<u>68525120</u>	<u>68525125</u>	<u>68525128</u>	<u>68525131</u>
magnetic material magnesite tridymite** quartz(tr) magnetite(tr)	green material magnesite tridymite** quartz(tr)	chlorite quartz amphibole epidote feldspar muscovite(tr)	quartz chlorite muscovite calcite feldspar	calcite quartz chlorite muscovite feldspar
<u>68525132</u>	<u>68525133</u>	<u>68525135</u>	<u>68525140</u>	<u>68525170</u>
calcite quartz chlorite muscovite feldspar	quartz calcite chlorite muscovite feldspar	muscovite calcite quartz chlorite hematite feldspar	quartz epidote	calcite quartz feldspar diopside prehnite chlorite
<u>68525761</u>	<u>68525767</u>	<u>68525768a</u>	<u>68525768b</u>	<u>68525768c</u>
calcite quartz chlorite muscovite feldspar aragonite(tr)	chlorite feldspar quartz epidote(tr) diopside(tr) pumpellyite (tr) lawsonite(tr)	quartz chlorite calcite epidote feldspar muscovite(tr)	calcite muscovite quartz feldspar hematite chlorite(tr)	calcite quartz chlorite muscovite feldspar

<u>68525768d</u>	<u>68526007</u>	<u>68526016</u>
calcite	calcite	calcite
quartz	quartz	quartz
feldspar	feldspar	feldspar
epidote	dolomite	chlorite
chlorite(tr)	muscovite(tr)	muscovite
	chlorite(tr)	aragonite(tr)

- * Though the pattern given by this mineral resembles that of cerolite (A.S.T.M. index pattern 5-739) more closely than that of any other mineral listed in the index, there are sufficient differences to leave some doubt as to its identity.
- ** Some doubt exists as to the presence of tridymite in these samples, even though the peaks were clearly defined and the patterns identical to the tridymite pattern in the A.S.T.M. index as H.L. Davies has not been able to locate tridymite in his thin sections. However he has found a siliceous mineral with a low refraction index which he believes may be an opaline material.
- It is possible that the tridymite could be present as small inclusions in this siliceous material.
- *** Additional work was done to confirm the identification of datolite (basic calcium boron silicate, $\text{Ca}(\text{BOH})\text{SiO}_4$). Diffraction patterns obtained from two specimens of datolite from the B.M.R. museum (no.785 from Bergin Hill, New Jersey, U.S.A. and no.2703 from Patterson, New Jersey, U.S.A.) were identical to that obtained from this sample. The presence of boron was confirmed by a methyl borate flame test carried out by A.D. Haldane.
1. 65521833(m) Magnetic separation made to confirm the presence of magnetite.

IDENTIFICATION OF MINERALS IN SILICIFIED CLAYSTONES
AND MUDSTONES FROM THE NORTHERN TERRITORY.

by

G.H. Berryman and S.E. Smith.

Six samples from the Victoria River District, 400 km. southwest of Katherine, N.T. were submitted by I.P. Sweet for mineral identification.

The samples were analysed by x-ray diffraction and the minerals identified, in order of relative intensities are listed below.

<u>Sample No.</u>	<u>Minerals Identified</u>
70770002	dolomite, quartz, muscovite.
70770486	quartz, K. feldspar*
70770487	K. feldspar*, quartz, illite.
K. 83. a.	quartz, kaolinite, illite, K. feldspar*.
K. 83. b.	quartz, kaolinite, illite, K. feldspar*.
K. 83. d.	quartz, kaolinite, illite, K. feldspar*.

* Although the patterns obtained for the K. feldspar are consistent with that given for high sanidine in the A.S.T.M. index (10-357) they also match the calculated powder pattern for adularia obtained by Collville & Ribbe, Am. Mineral., V. 53, p. 25-37 and appearing in the Geological Society of America Memoir No. 22, p. 686-690.

The samples consist of fine grained paralic sediments from the Precambrian and adularia would appear the more likely mineral to be found in such an environment.

IDENTIFICATION OF MINERALS IN IGNIMBRITES
FROM THE HUNTER VALLEY, N.S.W.

by

G.H. Berryman and S.E. Smith

Three samples from the Rouchel district, Upper Hunter Valley, N.S.W. were submitted by B.S. Oversby for mineral identification. The analyses were carried out by x-ray diffraction and the minerals identified, in order of relative intensities are listed below.

<u>Sample No.</u>	<u>Minerals Identified</u>
69820030	quartz, feldspar.
70820205	quartz, zeolite*.
71820508	quartz, feldspar, zeolite*.

* The patterns of these minerals were compared with all zeolite species listed in the A.S.T.M. index, and although positive identification of the particular species could not be made the patterns suggest they could be either clinoptilolite or mordenite, members of the heulandite group. The patterns did not match any of those given by members of the phillipsite, chabazite and natrolite groups.

CHEMICAL ANALYSIS OF TRAVERTINES FROM GOSSES BLUFF,NORTHERN TERRITORY

by

J.W. Sheraton

Thirteen samples of travertines from Gosses Bluff, Northern Territory, were submitted by G.H. Berryman for major element analysis. The analyses were carried out by X-ray fluorescence on material ignited at 900°C. Considerable difficulty was experienced in the preparation of fusion discs for sample numbers 70500207, 208, 209, 213 and 216. This is attributed to their unusual compositions, particularly the high MgO contents. The results for these samples should therefore be treated with extreme caution.

Sample No.	70500202	70500203	70500204	70500205	70500206
SiO ₂	6.6	17.7	6.0	5.1	2.7
TiO ₂	0.02	0.09	0.03	0.03	0.01
Al ₂ O ₃	0.53	1.44	0.59	0.53	0.24
*Fe ₂ O ₃	0.22	0.60	0.30	0.29	0.07
MnO	0.00	0.00	0.00	0.00	0.00
MgO	18.2	19.8	26.5	37.8	28.6
CaO	31.2	21.1	21.8	7.5	21.1
Na ₂ O	n.d.	n.d.	n.d.	n.d.	n.d.
K ₂ O	0.15	0.42	0.16	0.16	0.06
P ₂ O ₅	0.04	0.04	0.04	0.03	0.05
Loss on ignition	43.9	39.2	45.9	48.4	47.6
TOTAL	100.9	100.4	101.3	99.8	100.3

* Total iron as Fe₂O₃
n.d. not determined

Sample No.	70500207	70500208	70500209	70500210	70500211
SiO ₂	2.1	2.3	4.6	6.1	11.5
TiO ₂	0.00	0.01	0.00	0.05	0.04
Al ₂ O ₃	0.06	0.30	0.12	0.93	0.91
*Fe ₂ O ₃	0.01	0.14	0.05	0.43	0.35
MnO	0.00	0.00	0.00	0.00	0.00
MgO	42.6	39.5	45.0	23.3	4.4
CaO	6.0	11.0	3.75	24.8	43.6
Na ₂ O	n.d.	n.d.	n.d.	n.d.	n.d.
K ₂ O	0.01	0.09	0.03	0.29	0.32
P ₂ O ₅	0.02	0.02	0.01	0.06	0.10
Loss on ignition	50.8	49.4	49.4	44.9	39.2
TOTAL	101.6	102.7	103.0	100.8	100.5

Sample No.	70500213	70500214	70500216
SiO ₂	1.7	5.2	1.1
TiO ₂	0.02	0.05	0.00
Al ₂ O ₃	0.42	0.88	0.21
*Fe ₂ O ₃	0.15	0.28	0.08
MnO	0.00	0.00	0.00
MgO	39.8	27.6	45.9
CaO	10.2	20.0	2.15
Na ₂ O	n.d.	n.d.	n.d.
K ₂ O	0.10	0.28	0.05
P ₂ O ₅	0.03	0.04	0.01
Loss on ignition	49.8	45.9	51.2
TOTAL	102.2	100.3	100.6

* Total iron as Fe₂O₃
n.d. not determined

SPECTROGRAPHIC ANALYSIS OF EVAPORITE SAMPLE

by

J. Weekes

A sample of Evaporite, regd no. 71500007 was submitted by A.T. Wells for analysis of K, B, Fe, Mn, Sr and Ba. The sample was examined semi quantitatively over the wave length range 8000-2480Å using the emission spectrograph with D.C. arc.

Results, in ppm, were:-

K	B	Fe	Mn	Sr	Ba
13,000	50	10,000	6	50	15

2 June, 1971

Laboratory Report No. 65

CHEMICAL ANALYSIS OF VOLCANIC ROCKS FROM
THE TERRITORY OF PAPUA AND NEW GUINEA

by
J.W. Sheraton

Forty-six samples of volcanic rocks from the territory of Papua and New Guinea were submitted by G.A.M. Taylor for major element analysis. The analyses were carried out by X-ray fluorescence, using material ignited at 900°C.

Sample No. *	0261B	0262	0265	0267	0268	0271
SiO ₂	57.8	68.1	47.0	48.3	48.8	47.3
TiO ₂	0.39	0.21	0.77	0.80	0.90	0.75
Al ₂ O ₃	17.01	18.41	13.62	15.05	16.43	13.96
+Fe ₂ O ₃	5.22	1.75	11.31	10.77	10.99	11.36
MnO	0.10	0.00	0.18	0.21	0.21	0.21
MgO	5.9	0.4	5.9	5.5	4.6	6.4
CaO	0.46	0.13	11.58	10.34	9.43	11.11
Na ₂ O	3.5	3.6	5.1	4.5	4.9	4.3
K ₂ O	2.69	6.25	1.13	3.63	3.52	3.53
P ₂ O ₅	0.21	0.08	0.55	0.57	0.56	0.55
Loss on ignition	4.63	2.39	3.85	0.80	0.11	0.69
TOTAL	98.0	101.3	101.0	100.4	100.5	100.1

Sample No.*	0275	0276	0280	0282	0284	0286
SiO ₂	46.2	48.0	48.0	53.5	51.4	48.0
TiO ₂	0.80	0.83	0.79	0.46	0.46	0.77
Al ₂ O ₃	15.59	15.66	14.55	20.03	19.90	15.23
+Fe ₂ O ₃	9.92	10.54	10.25	5.08	5.00	10.34
MnO	0.15	0.22	0.21	0.18	0.18	0.19
MgO	5.7	5.5	6.8	1.6	1.5	5.0
CaO	10.28	9.90	10.92	4.11	4.32	10.05
Na ₂ O	4.6	5.2	4.1	4.7	4.9	5.2
K ₂ O	2.31	3.97	3.47	6.29	3.48	2.74
P ₂ O ₅	0.67	0.62	0.58	0.29	0.19	0.60
Loss on ignition	4.08	0.22	0.71	3.32	7.57	2.48
TOTAL	100.3	100.6	100.2	99.6	98.9	100.5

Sample No.*	0292	0293	0295	0300	0312	0314
SiO ₂	49.4	50.4	47.6	49.1	54.7	53.3
TiO ₂	0.72	0.68	0.74	0.77	0.73	0.76
Al ₂ O ₃	16.62	17.62	15.42	16.42	16.55	18.10
+Fe ₂ O ₃	8.78	8.40	9.89	9.38	7.20	7.03
MnO	0.16	0.19	0.18	0.20	0.11	0.14
MgO	4.1	3.8	5.5	4.4	3.5	2.9
CaO	7.87	7.60	10.01	8.71	5.91	5.71
Na ₂ O	4.7	4.9	5.0	5.6	6.6	7.0
K ₂ O	4.06	4.54	1.92	2.78	3.15	3.52
P ₂ O ₅	0.49	0.48	0.55	0.52	0.41	0.45
Loss on ignition	2.54	1.42	4.09	2.44	1.00	0.69
TOTAL	99.4	100.1	100.8	100.2	99.9	99.6

Sample No.*	0322	0333	0334	0337	0338	0343
SiO ₂	45.1	45.2	50.0	53.7	44.1	48.4
TiO ₂	0.94	1.02	0.72	0.55	1.10	0.94
Al ₂ O ₃	15.06	13.10	17.86	15.44	15.16	16.87
+Fe ₂ O ₃	11.80	11.82	8.20	6.01	11.70	11.38
MnO	0.22	0.21	0.18	0.11	0.21	0.19
MgO	5.1	6.7	3.3	3.8	5.9	5.7
CaO	10.61	12.38	6.93	7.84	12.11	11.14
Na ₂ O	3.3	5.6	5.7	3.6	4.5	4.2
K ₂ O	3.98	3.51	4.44	1.82	1.85	1.23
P ₂ O ₅	0.72	0.72	0.53	0.25	0.39	0.44
Loss on ignition	1.22	0.51	1.57	5.13	1.27	1.07
TOTAL	98.1	100.7	99.5	98.2	98.5	101.5

Sample No.*	0345	0348	0354	0356	0361	0363
SiO ₂	47.6	45.7	46.8	47.8	47.8	46.5
TiO ₂	1.07	1.05	1.13	1.18	0.60	0.78
Al ₂ O ₃	17.73	16.75	16.13	16.04	9.13	12.13
+Fe ₂ O ₃	10.85	10.44	11.56	11.53	9.54	11.19
MnO	0.21	0.21	0.21	0.20	0.17	0.19
MgO	4.8	5.0	5.9	5.6	11.8	8.7
CaO	10.92	10.56	11.15	11.08	17.39	15.56
Na ₂ O	4.9	5.4	2.8	4.1	2.3	1.8
K ₂ O	1.71	1.41	1.72	1.69	0.39	1.51
P ₂ O ₅	0.63	0.58	30.33	0.45	0.24	0.38
Loss on ignition	1.33	1.34	1.88	1.11	2.18	2.57
TOTAL	101.7	98.5	99.6	100.7	101.7	101.3

Sample No.*	0365B	0369	0371	0373	0377	0378
SiO ₂	51.0	50.8	49.7	48.6	47.0	51.4
TiO ₂	0.78	0.79	0.87	0.52	0.84	0.75
Al ₂ O ₃	15.66	15.48	15.62	20.42	17.40	17.72
+Fe ₂ O ₃	9.33	9.58	10.47	2.16	9.90	7.94
MnO	0.18	0.19	0.19	0.00	0.20	0.16
MgO	5.8	5.7	5.8	0.2	5.2	4.8
CaO	9.81	10.18	10.04	0.02	10.26	8.65
Na ₂ O	3.8	4.3	3.1	0.4	4.4	4.8
K ₂ O	2.61	2.55	2.47	8.26	2.01	2.83
P ₂ O ₅	0.34	0.34	0.36	0.16	0.38	0.29
Loss on ignition	1.22	0.38	1.34	18.09	1.88	1.22
TOTAL	100.5	100.3	100.0	98.9	99.4	100.6

Sample No.*	0385	0387	0395	0402	0404	0412
SiO ₂	51.9	55.5	45.8	50.8	51.2	42.9
TiO ₂	0.44	0.46	0.92	0.52	0.53	0.90
Al ₂ O ₃	18.40	19.84	15.49	19.05	19.08	15.61
+Fe ₂ O ₃	5.53	5.68	11.34	6.95	7.06	11.65
MnO	0.17	0.18	0.18	0.17	0.19	0.20
MgO	1.5	1.4	6.5	2.9	2.7	6.1
CaO	7.08	3.98	11.99	6.66	8.36	11.02
Na ₂ O	4.3	4.7	3.1	6.1	6.3	1.9
K ₂ O	3.35	4.40	2.38	3.28	3.61	3.14
P ₂ O ₅	0.28	0.35	0.50	0.39	0.42	0.43
Loss on ignition	5.24	2.71	1.71	3.75	1.45	5.25
TOTAL	98.2	99.1	100.0	100.5	100.9	99.1

Sample No.*	0424	0434	0439	0446
SiO ₂	57.0	50.6	45.6	48.3
TiO ₂	0.61	0.79	0.73	0.65
Al ₂ O ₃	17.51	16.96	12.13	12.09
+Fe ₂ O ₃	6.12	9.08	11.14	10.49
MnO	0.13	0.21	0.21	0.19
MgO	2.2	5.0	8.3	9.0
CaO	5.73	8.76	13.74	14.25
Na ₂ O	4.2	4.2	2.2	2.5
K ₂ O	2.89	2.71	0.85	0.72
P ₂ O ₅	0.22	0.37	0.30	0.24
Loss on ignition	1.72	1.46	3.23	2.62
TOTAL	98.3	100.2	98.5	101.0

* Sample numbers are 69400261B to 69400446

+ Total iron as Fe₂O₃

CHEMICAL ANALYSIS OF PEBBLES FROM THE
KURRAWANG CONGLOMERATE, NEAR KALGOORLIE,
WESTERN AUSTRALIA

by

J.W. Sheraton

Seventeen samples of granite and porphyry pebbles from the Kurrawang Conglomerate, near Kalgoorlie, Western Australia were submitted by A.Y. Glikson for major element analysis. The analyses were carried out by X-ray fluorescence using material ignited at 900°C.

Sample No.*	01	02	03	04	05	06
SiO ₂	73.4	74.3	73.2	75.7	73.3	70.0
TiO ₂	0.22	0.22	0.46	0.11	0.29	0.41
Al ₂ O ₃	14.34	14.33	12.23	12.93	14.30	13.48
⁺ Fe ₂ O ₃	2.16	1.74	3.06	2.17	1.86	5.75
MnO	0.05	0.04	0.07	0.04	0.06	0.09
MgO	1.0	0.5	1.0	0.5	0.5	1.8
CaO	1.34	1.34	1.63	1.92	1.94	2.04
Na ₂ O	6.8	6.9	5.5	6.3	6.8	4.6
K ₂ O	0.69	0.62	0.74	0.37	0.58	1.59
P ₂ O ₅	0.07	0.06	0.09	0.01	0.13	0.10
Loss on ignition	1.10	0.91	1.07	0.87	1.27	0.74
TOTAL	101.2	101.0	99.0	100.9	100.9	100.6

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Sample No.*	07	08	09	10	11	12
SiO ₂	71.6	78.8	74.9	74.8	77.2	73.9
TiO ₂	0.36	0.13	0.21	0.63	0.08	0.13
Al ₂ O ₃	13.84	11.50	12.53	12.51	13.43	14.13
+Fe ₂ O ₃	3.93	1.73	1.41	3.16	0.65	1.00
MnO	0.08	0.02	0.02	0.06	0.03	0.03
MgO	1.4	0.1	0.3	1.1	0.2	0.3
CaO	2.17	1.27	1.51	1.98	0.54	1.40
Na ₂ O	5.0	6.7	6.4	5.3	7.9	7.7
K ₂ O	1.10	0.18	0.52	1.00	0.25	0.45
P ₂ O ₅	0.09	0.02	0.06	0.20	0.01	0.04
Loss on ignition	0.81	0.63	1.33	0.46		1.32
TOTAL	100.3	101.0	99.2	101.1	100.7	100.4

Sample No.*	13	14	15	16	17
SiO ₂	71.7	74.8	74.1	76.7	74.0
TiO ₂	0.33	0.14	0.16	0.10	0.11
Al ₂ O ₃	15.18	14.07	14.35	13.12	13.48
+Fe ₂ O ₃	1.36	1.46	1.11	0.79	0.81
MnO	0.03	0.03	0.04	0.02	0.02
MgO	0.5	0.4	0.3	0.2	0.3
CaO	1.97	0.79	1.88	0.56	1.30
Na ₂ O	7.3	7.3	6.7	7.9	7.0
K ₂ O	0.65	0.60	0.56	0.29	0.64
P ₂ O ₅	0.09	0.03	0.04	0.02	0.03
Loss on ignition	1.48	0.67	1.61	0.59	1.48
TOTAL	100.5	100.4	100.9	100.3	99.2

* Sample numbers are prefixed 708700.

+ Total iron as Fe₂O₃

CHEMICAL ANALYSIS OF VOLCANIC ROCKS
FROM THE TERRITORY OF PAPUA AND NEW GUINEA

by

J.W. Sheraton

Thirty-eight samples of volcanic rocks from the Territory of Papua and New Guinea were submitted by R.W. Page for major element analysis. The analyses were carried out by X-ray fluorescence, using material ignited at 900°C.

Sample No.	5453	5459	5461	5971	5972	11NG2174
SiO ₂	60.1	51.5	59.6	56.4	66.6	46.4
TiO ₂	0.43	1.05	0.75	0.87	0.52	1.11
Al ₂ O ₃	20.76	18.89	16.51	16.55	15.54	20.66
Fe ₂ O ₃	4.30	9.81	5.84	8.00	3.67	9.50
MnO	0.07	0.17	0.14	0.16	0.11	0.18
MgO	1.6	4.4	3.3	3.3	0.9	5.7
CaO	6.97	8.66	4.99	6.81	2.05	12.24
Na ₂ O	4.6	3.5	2.9	3.0	4.8	2.6
K ₂ O	1.63	1.38	2.77	3.00	4.58	0.51
P ₂ O ₅	0.13	0.33	0.25	0.44	0.18	0.37
Loss on ignition	0.36	0.43	2.52	0.97	0.29	1.22
TOTAL	100.9	100.1	99.6	99.5	99.1	100.5

Sample No.	11NG2181	11NG2182	11NG2185	11NG2188	11NG2192	12NG2142A
SiO ₂	58.7	50.3	57.8	49.1	42.5	61.8
TiO ₂	0.78	1.03	0.90	1.00	1.30	0.57
Al ₂ O ₃	16.98	20.04	17.21	19.93	20.32	17.33
+Fe ₂ O ₃	7.47	10.07	8.33	8.63	13.42	6.19
MnO	0.15	0.18	0.17	0.16	0.18	0.17
MgO	3.0	4.1	3.3	4.6	6.5	2.1
CaO	7.07	10.53	7.21	11.11	15.54	7.11
Na ₂ O	3.5	3.4	3.9	2.8	1.2	3.8
K ₂ O	1.33	0.25	1.12	0.79	0.18	0.82
P ₂ O ₅	0.17	0.26	0.20	0.18	0.05	0.24
Loss on ignition	0.77	0.61	0.53	1.60	0.17	0.34
TOTAL	100.0	100.8	100.6	99.9	101.4	100.5

Sample No.	12NG2144	20NG2001	20NG2006	20NG2016	20NG2023	20NG2024
SiO ₂	57.5	38.1	39.8	57.0	66.1	64.3
TiO ₂	0.94	1.82	1.47	0.74	0.54	0.56
Al ₂ O ₃	16.85	18.94	18.37	17.11	15.78	15.67
+Fe ₂ O ₃	8.11	13.65	13.73	7.32	4.64	4.78
MnO	0.14	0.13	0.16	0.15	0.10	0.10
MgO	3.9	7.9	6.7	3.8	2.1	2.0
CaO	6.94	15.46	17.82	7.06	4.61	4.75
Na ₂ O	2.9	1.3	0.9	4.0	3.6	3.6
K ₂ O	2.24	0.93	0.41	0.69	2.52	2.45
P ₂ O ₅	0.24	1.71	1.36	0.23	0.18	0.19
Loss on ignition	0.57	0.36	0.36	0.65	0.38	0.38
TOTAL	100.3	100.4	101.0	98.7	100.6	98.9

Sample No.	2ONG2028	2ONG2034	2ONG2035	2ONG2039	2ONG2041C	2ONG2079
SiO ₂	51.0	62.8	53.2	65.6	69.4	76.9
TiO ₂	0.88	0.65	1.36	0.55	0.40	0.09
Al ₂ O ₃	18.23	15.97	17.63	15.36	15.98	12.26
+Fe ₂ O ₃	10.40	5.54	9.20	4.83	3.76	0.81
MnO	0.18	0.11	0.17	0.10	0.10	0.01
MgO	4.8	2.5	4.0	2.1	1.5	0.2
CaO	9.54	5.39	8.06	4.86	1.63	0.61
Na ₂ O	2.5	3.7	3.9	3.6	5.4	3.47
K ₂ O	0.75	2.18	1.20	1.91	0.81	5.5
P ₂ O ₅	0.22	0.18	0.53	0.15	0.13	0.02
Loss on ignition	0.83	0.21	0.07	0.58	1.56	0.12
TOTAL	99.3	99.3	99.3	99.6	100.6	99.9

Sample No.	2ONG2087	2ONG2089	2ONG2090	2ONG2091	2ONG2092	2ONG2093
SiO ₂	47.2	64.9	72.8	76.7	77.7	72.4
TiO ₂	2.12	0.57	0.30	0.08	0.08	0.31
Al ₂ O ₃	15.74	15.48	14.13	12.31	12.56	13.84
+Fe ₂ O ₃	14.27	4.93	2.09	0.82	0.61	2.38
MnO	0.27	0.12	0.03	0.01	0.00	0.03
MgO	5.2	1.9	0.4	0.2	0.2	1.0
CaO	8.52	3.49	1.77	0.41	0.39	2.14
Na ₂ O	3.5	3.7	3.8	3.8	3.8	4.0
K ₂ O	1.24	2.67	3.86	5.03	4.80	3.59
P ₂ O ₅	0.79	0.19	0.07	0.03	0.02	0.08
Loss on ignition	0.55	2.17	0.62	0.31	0.35	0.24
TOTAL	99.4	100.2	99.8	99.7	100.5	100.1

Sample No.	2ONG2094	2ONG2097	2ONG2102	2ONG2104
SiO ₂	63.8	42.8	61.2	73.5
TiO ₂	0.67	1.59	1.07	0.30
Al ₂ O ₃	16.53	20.28	16.34	13.51
+Fe ₂ O ₃	5.08	13.07	6.15	2.11
MnO	0.08	0.15	0.11	0.02
MgO	2.4	7.4	1.8	0.4
CaO	4.28	13.71	4.24	1.26
Na ₂ O	4.4	1.5	4.6	3.8
K ₂ O	2.61	0.21	3.29	5.04
P ₂ O ₅	0.23	0.04	0.32	0.06
Loss on ignition	0.55	0.37	0.16	0.20
TOTAL	100.6	101.2	99.4	100.2

Sample No.	2ONG2135	2ONG2176	2ONG2191	2ONG2209
SiO ₂	48.0	54.0	49.3	55.1
TiO ₂	3.45	0.87	0.65	0.72
Al ₂ O ₃	15.41	15.67	18.69	18.41
+Fe ₂ O ₃	11.89	7.44	9.79	8.18
MnO	0.17	0.19	0.18	0.15
MgO	3.7	5.5	6.3	3.7
CaO	10.61	9.22	11.60	7.62
Na ₂ O	3.6	3.2	1.8	3.1
K ₂ O	0.27	1.70	0.55	1.09
P ₂ O ₅	0.46	0.37	0.15	0.26
Loss on ignition	2.73	1.40	0.97	1.02
TOTAL	100.4	99.6	100.0	99.3

+ Total iron as Fe₂O₃.

MARBLE DRILL CORE SAMPLES FROM
RAMU 1 HYDROELECTRIC SCHEME SITE, T.P.N.G.

by

C.W. Claxton

Three samples of drill core were submitted by Dr E.K. Carter, on behalf of the Department of Works, on 28th May, 1971.

The samples were taken from the Omaura Greywake formation on the site of the Ramu 1 Hydroelectric Scheme (Record 1970/53).

After crushing the samples were analysed chemically. Silica was determined on the residue remaining after opening the samples with hydrochloric acid. The residue was filtered off, ignited, tared, and treated with hydrofluoric and perchloric acids prior to volatilising the silica. The residue from the silica determination was fused with fusion mixture, leached in HCl and added to the filtrate which was made up to volume and aliquoted for the sulphate determination. A gravimetric procedure was used after precipitation of the sulphate by Barium. The remaining elements were determined by atomic absorption spectrometry.

Sample No.	Hole	Depth (ft)	H ₂ O	SiO ₂	percentage Composition				
					Ca	Mg	Fe	Al	SasSO ₄
71370001	DD 19	808	0.27	3.8	37.3	0.72	0.16	0.42	0.58
02	DD 19	927	0.27	4.4	36.5	0.66	0.31	0.72	0.57
03	DD 22	676	0.10	0.4	38.8	0.64	0.09	0.06	0.65

Samples dried at 105°C for two hours.

Analysis of Imported Sweets

by

C.W. Claxton

Two combinations of sweets manufactured in Hong Kong were submitted by Bruce Christiansen, of the Institute of Anatomy, on 19 May 1971, for the estimation of the cadmium content.

Samples of variously coloured units were digested separately with sulphuric acid and hydrogen peroxide to destroy the organic matter. The extracts were made to volume and cadmium determined by the Atomic Absorption Spectrophotometer.

All samples were found to contain less than 0.2 parts per million Cadmium.

ANALYSIS OF SEDIMENTS FROMGARUA HARBOUR, NEW BRITAIN

by

S.E. Smith and T.I. Slezak

Twenty seven samples of sediment from Garua Harbour, New Britain, submitted by I.B. Lambert, were analysed by optical emission spectroscopy on the Hilger and Watts 3 metre Polychromator for Ba, Ca, Co, Cr, Cu, Fe, La, Mg, Mn, Ni, Sc, Sr, Ti, V, Y, and Zr. The samples were ignited at 1000°C for 4 hours. The results, listed below, are on the basis of ignited material.

The analytical method used was adapted from Ahrens and Taylor ("Spectrochemical Analysis", 1961, p. 189, Addison-Wesley Publishing Company). One part of sample was mixed with two parts of graphite (National Carbon Company Type L4160, Grade SP-2). The mix was loaded into a preformed graphite electrode (National Carbon Company Type L4206) and arced as the anode at a constant 8 amps D.C. for 130 seconds. Both internal standard and rock standard control were used.

Sample No.	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	La (ppm)	Mg (%)
03	170	+10.0	12	70	25	4.6	-100	2.7
04	210	+10.0	12	82	30	4.5	-100	2.6
05	210	+10.0	13	78	28	4.8	-100	2.3
06	170	+10.0	13	72	27	4.6	-100	2.8
010	170	+10.0	11	170	52	3.7	-100	3.7
011	150	+10.0	11	110	76	4.0	-100	2.6
020D	150	+10.0	12	69	21	4.5	-100	3.5
020S	160	+10.0	12	80	35	4.6	-100	3.8
021	150	8.2	16	180	65	7.0	-100	3.2
023	190	6.0	14	115	36	6.0	-100	2.8
024	190	5.4	16	115	43	6.6	-100	2.9
026	220	5.9	17	100	38	6.2	-100	2.3
027	250	3.9	14	92	32	5.6	-100	1.6
029	270	5.2	16	105	34	6.1	-100	2.2
030	220	7.5	14	77	35	5.5	-100	2.0
031	240	5.0	18	85	41	7.0	-100	2.6
033	210	5.8	20	100	47	8.6	-100	3.4
034	220	4.5	17	77	45	7.6	-100	2.6
036	290	2.3	13	105	50	6.8	-100	1.4
039	270	2.9	19	190	65	6.5	-100	1.6
040	180	6.8	23	135	49	7.9	-100	3.2
041	190	+10.0	23	140	62	7.4	-100	3.9
042	140	+10.0	20	96	49	6.8	-100	4.5
043	310	4.4	17	95	44	8.4	-100	2.1
044	240	3.7	15	72	36	5.8	-100	1.7
045	210	3.6	17	120	40	8.3	-100	1.5
046	240	4.5	19	94	75	6.3	-100	2.3

Sample No.	Mn (%)	Ni (ppm)	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)	Loss on ignition (%)
C3	0.10	12	20	1250	0.29	84	15	-100	17.63
C4	0.11	13	21	1000	0.33	82	19	-100	14.23
C5	0.10	13	20	1050	0.30	82	20	-100	14.22
C6	0.10	12	20	1050	0.28	82	17	-100	17.07
C10	0.10	14	20	1500	0.27	70	15	-100	23.64
C11	0.08	14	19	1150	0.25	62	17	-100	22.05
C20D	0.14	13	20	1300	0.29	78	16	-100	20.62
C20S	0.15	15	20	1300	0.30	80	16	-100	20.79
C21	0.08	15	23	620	0.34	120	20	-100	16.44
C23	0.08	13	23	480	0.31	90	18	-100	8.97
C24	0.08	14	25	380	0.31	100	19	-100	7.22
C26	0.08	14	23	470	0.34	110	20	-100	6.80
C27	0.09	13	21	390	0.32	90	22	-100	5.59
C29	0.10	13	22	430	0.35	110	20	-100	5.33
C30	0.09	13	22	640	0.34	82	23	-100	10.23
C31	0.10	18	22	370	0.34	100	26	-100	7.09
C33	0.11	19	25	400	0.39	130	26	-100	7.53
C34	0.10	13	22	340	0.35	120	21	-100	6.41
C36	0.07	12	20	210	0.30	90	22	-100	8.30
C39	0.08	19	24	270	0.40	110	23	120	19.00
C40	0.11	23	26	480	0.40	180	20	-100	6.88
C41	0.12	20	27	800	0.41	200	18	-100	14.14
C42	0.11	20	25	1050	0.38	200	16	-100	14.20
C43	0.12	14	25	340	0.41	130	20	-100	6.44
C44	0.11	13	22	300	0.30	76	21	-100	8.20
C45	0.09	15	25	280	0.30	105	24	-100	7.03
C46	0.12	16	24	330	0.34	110	21	-100	5.71

Analysis of Basalts from
Victoria River District, N.T.

by

S.E. Smith and T.I. Slezak

307 samples of basalts from Victoria River District, N.T. submitted by R.J. Bultitude, were analysed by optical emission, spectroscopy on the Hilger and Watts 3 metre Polychromator for Ba, Ca, Cr, Cu, Fe, Mg, Mn, Ni, Sc, Sr, Ti, V, Y, and Zr.

The analytical method used was adapted from Ahrens and Taylor ("Spectrochemical Analysis", 1961, p. 189, Addison - Wesley Publishing Company). One part of sample was mixed with two parts of graphite (National Carbon Company Type L4160, Grade SP-2). The mix was loaded into a preformed graphite electrode (National Carbon Company Type L4206) and arced as the anode at a constant 8 amps D.C. for 130 seconds. Both internal standard and rock standard control were used.

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
69770104	235	6.4	62	31	4.9	2.4	0.13	52
107	165	7.0	350	52	4.0	3.6	0.11	105
112	210	5.4	62	70	5.0	3.1	0.12	52
114	365	6.0	47	43	6.2	3.1	0.15	60
116	245	5.8	60	23	5.4	2.4	0.12	62
117	310	5.6	50	18	6.0	2.3	0.11	60
118	310	6.4	32	48	6.8	1.8	0.16	44
137	310	4.7	105	195	4.6	3.7	0.15	66
140	190	6.0	350	105	4.5	4.7	0.10	110
142	240	5.4	210	34	5.1	2.8	0.09	78
70770248	700	5.0	25	98	6.4	2.7	0.24	43
265	235	5.6	125	44	4.7	4.5	0.13	66
269	210	6.0	22	17	5.4	3.1	0.13	41
270	250	5.8	350	115	5.0	4.3	0.13	140
376	235	5.6	22	21	5.8	2.8	0.13	39
377	295	5.2	100	+200	5.6	3.1	0.16	56
537	215	9.8	200	92	6.4	4.5	0.16	100
539	195	6.8	155	58	6.4	3.8	0.12	88
542	250	5.6	68	52	6.0	4.0	0.11	56
545	260	5.8	68	32	6.4	4.7	0.14	56
550	265	6.6	70	100	6.4	4.2	0.15	56
557	120	6.4	370	31	4.6	+5.0	0.11	120
558	120	6.0	340	35	4.5	4.8	0.11	120
560	190	4.6	330	22	4.3	4.8	0.21	115

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
70770567	250	6.0	39	26	5.9	3.7	0.12	54
571	180	5.2	42	18	5.6	3.8	0.13	56
574	215	6.8	41	21	6.0	3.5	0.15	56
576	270	5.4	36	18	6.3	3.2	0.14	41
581	275	4.7	145	28	5.0	4.0	0.10	66
582	280	4.5	140	33	5.1	4.1	0.13	68
584	255	6.0	130	38	4.4	4.0	0.12	64
587	210	5.8	155	30	4.8	3.2	0.11	74
589	210	5.6	140	52	4.9	3.0	0.11	68
592	185	6.0	135	41	5.1	4.1	0.11	68
594	305	5.0	165	28	5.4	+5.0	0.13	56
596	295	5.6	165	18	4.6	4.1	0.11	58
599	320	4.6	58	27	6.3	2.7	0.18	44
601	255	4.6	52	54	5.4	2.1	0.13	42
612	275	4.8	44	50	5.2	3.7	0.13	49
614	285	5.2	45	33	5.2	2.9	0.13	54
750	80	2.7	105	39	3.3	2.5	0.05	62
751	340	4.4	54	78	5.8	3.0	0.11	45
752	245	5.0	150	96	5.1	4.4	0.12	94
753	130	4.9	210	47	4.4	4.4	0.08	76
754	275	4.0	210	35	4.5	3.9	0.12	74
755	245	4.6	140	66	4.6	5.0	0.09	64
756	250	6.0	250	34	5.2	5.0	0.15	84
757	255	4.6	48	42	5.0	2.6	0.12	54
758	265	4.5	150	26	5.0	4.3	0.12	50
760	190	4.5	185	28	5.1	3.8	0.09	66
761	220	1.3	45	18	5.8	3.5	0.07	47
763	220	6.6	130	24	6.0	4.7	0.16	74
764	370	1.6	54	88	6.2	4.3	0.11	58
765	395	3.5	56	44	5.8	2.9	0.17	60
766	270	5.2	58	44	4.8	1.8	0.08	68
767	295	3.5	52	28	5.6	3.9	0.16	56
768	190	6.0	120	24	5.2	3.2	0.17	70
769	205	6.0	82	24	5.8	4.3	0.15	66
770	310	1.0	35	27	7.0	3.2	0.06	46
771	245	4.2	54	56	5.0	3.2	0.11	60
772	350	4.9	76	52	6.0	3.4	0.13	56
773	245	5.8	47	27	6.0	3.9	0.15	58
774	270	5.6	49	28	5.2	2.8	0.06	56
775	225	4.9	64	60	6.0	3.4	0.13	66
776	240	5.6	52	46	5.7	3.3	0.10	60
777	265	5.6	76	48	5.3	2.6	0.12	72
778	325	4.1	54	27	6.2	1.9	0.06	74
779	330	4.0	54	52	6.3	3.5	0.16	62
780	340	5.2	66	26	5.9	4.2	0.17	60
781	410	5.6	62	60	6.2	5.0	0.15	60
782	270	5.8	84	31	6.0	4.3	0.14	60
783	200	1.4	46	23	6.0	2.0	0.06	50
784	270	6.6	72	60	6.2	5.0	0.15	66
785	220	3.8	60	38	5.8	3.5	0.13	60
790	260	6.6	220	23	5.4	+5.0	0.13	86
791	310	5.2	46	54	5.6	3.3	0.14	56

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
70770792	225	5.6	185	40	5.3	4.6	0.11	78
793	95	1.4	125	14	5.6	4.8	0.05	76
794	330	5.8	50	78	5.7	4.5	0.16	54
795	85	2.4	52	20	5.7	4.4	0.05	41
796	365	4.2	200	49	5.2	+5.0	0.10	84
797	410	5.8	200	49	5.6	4.9	0.14	80
798	160	6.4	330	80	5.1	+5.0	0.12	120
799	345	3.3	380	52	4.1	+5.0	0.11	105
800	385	2.8	68	40	5.8	3.0	0.11	52
801	210	6.2	350	48	4.9	5.0	0.11	120
802	200	6.0	340	38	4.5	4.5	0.10	110
803	305	5.8	54	39	5.9	2.8	0.21	42
804	345	5.4	105	40	6.8	3.6	0.14	57
805	265	6.4	380	50	5.1	4.7	0.10	115
806	325	5.8	52	44	6.8	3.1	0.15	45
807	265	4.6	36	115	5.2	2.6	0.19	43
808	335	5.0	68	20	7.1	3.5	0.17	43
809	460	2.5	350	24	4.4	+5.0	0.16	105
810	275	4.8	72	23	6.0	4.4	0.13	54
811	155	7.6	380	44	4.8	+5.0	0.13	120
812	380	3.5	100	68	5.2	3.7	0.15	61
813	355	6.6	49	43	6.4	4.2	0.15	37
814	140	7.2	350	47	6.0	+5.0	0.12	110
815	320	3.9	56	33	6.3	3.6	0.15	44
816	300	3.3	45	35	6.0	2.8	0.17	47
817	140	6.8	350	120	4.5	4.0	0.10	115
818	85	4.4	190	39	6.0	3.6	0.10	65
819	335	3.2	190	40	5.2	3.9	0.10	73
820	225	7.8	155	76	5.1	3.7	0.12	69
821	245	6.6	215	21	5.4	+5.0	0.12	80
822	315	4.0	195	43	5.4	+5.0	0.11	82
823	305	6.4	82	30	6.5	+5.0	0.15	58
824	170	6.4	300	45	5.3	+5.0	0.13	91
825	240	5.8	64	44	5.6	2.8	0.12	50
826	285	5.8	62	29	6.2	4.0	0.13	51
827	275	5.0	68	35	5.8	3.0	0.13	53
829	150	6.6	340	29	4.0	3.1	0.10	110
830	135	3.4	48	40	5.6	4.7	0.16	37
832	250	5.8	66	36	6.8	4.6	0.15	55
833	275	3.2	86	115	5.6	4.7	0.07	58
834	480	3.1	60	23	6.2	+5.0	0.14	51
835	275	4.6	72	23	6.2	4.2	0.16	64
836	170	5.8	66	48	6.4	4.1	0.13	66
837	220	5.4	38	19	6.3	4.1	0.16	57
838	145	8.0	400	35	5.0	+5.0	0.13	135
839	165	7.8	340	58	5.2	+5.0	0.12	105
840	160	8.2	420	58	5.2	+5.0	0.14	125
841	270	5.6	48	22	6.6	3.3	0.14	38
842	75	+10.0	32	37	1.0	0.4	0.20	20
843	140	+10.0	48	88	1.2	0.4	0.37	30
844	170	+10.0	47	34	2.1	0.2	0.09	35

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
70770845	230	1.5	200	38	4.5	4.0	0.08	98
846	255	7.2	150	43	5.6	4.6	0.14	74
847	170	1.8	240	24	4.6	2.4	0.07	105
848	220	6.0	135	29	5.6	3.5	0.12	75
849	300	5.6	125	25	5.2	3.2	0.10	71
850	200	2.2	220	31	5.7	5.0	0.09	100
851	220	5.6	130	30	5.4	4.8	0.13	70
852	90	6.0	160	48	4.6	4.2	0.11	83
853	165	8.0	195	54	5.8	+5.0	0.14	88
854	150	7.0	170	56	5.2	4.0	0.13	85
855	290	6.8	135	28	5.8	4.7	0.11	74
856	130	6.6	180	44	4.9	3.4	0.11	90
857	190	6.6	130	68	5.8	3.3	0.11	74
858	240	5.8	98	62	6.4	4.5	0.14	61
859	345	4.2	46	48	6.0	+5.0	0.12	54
860	220	8.0	145	25	5.2	4.7	0.10	69
861	285	5.8	52	56	6.9	3.6	0.13	46
862	245	8.0	46	20	6.6	4.2	0.19	60
863	225	7.0	105	33	5.0	4.8	0.12	59
864	325	3.9	78	41	5.4	3.5	0.07	47
865	320	6.4	14	21	7.1	4.5	0.18	30
866	325	6.6	92	18	6.0	3.0	0.12	49
867	305	6.2	18	36	6.8	3.5	0.13	35
868	410	6.0	34	20	7.0	3.7	0.16	42
869	310	4.8	84	19	6.2	2.4	0.14	49
870	315	5.2	130	72	5.6	+5.0	0.14	70
871	235	7.2	185	41	6.4	+5.0	0.15	77
872	210	7.4	155	15	6.2	+5.0	0.13	82
873	380	5.2	24	22	7.0	2.4	0.12	37
874	200	7.2	140	52	5.7	+5.0	0.14	74
875	375	4.6	18	66	7.3	2.7	0.17	25
488	310	4.5	24	56	6.6	3.3	0.15	44
493	330	4.7	15	21	6.6	2.8	0.15	30
495	315	4.4	42	30	6.1	1.8	0.08	43
501	300	7.4	40	47	6.4	3.2	0.16	43
507	300	6.8	80	21	6.4	3.5	0.19	52
512	205	5.0	150	19	5.0	3.1	0.12	69
513	230	6.0	100	15	4.7	2.3	0.11	54
514	205	6.2	195	52	4.9	4.2	0.12	74
515	190	6.0	140	27	5.2	3.5	0.11	77
517	215	6.8	130	62	5.4	4.0	0.12	78
518	350	6.8	130	64	5.5	+5.0	0.15	74
521	325	4.0	200	41	6.6	4.3	0.16	35
786	410	2.8	56	19	5.6	4.8	0.14	50
787	275	3.8	90	90	5.5	4.4	0.08	62
788	310	5.2	60	31	6.4	3.4	0.17	58
789	220	6.2	70	49	6.4	4.1	0.15	67
828	440	3.2	58	18	5.7	3.9	0.13	54
831	250	6.0	72	35	6.4	3.8	0.14	57
900	275	1.0	20	25	7.5	4.2	0.05	35
901	295	3.5	19	40	6.6	3.0	0.09	38
902	235	4.6	18	23	6.2	2.9	0.12	38

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
70770903	330	4.1	19	58	6.0	3.0	0.15	31
904	390	8.5	23	38	7.4	+5.0	0.22	39
905	325	3.2	23	27	7.6	+5.0	0.19	34
906	270	4.5	60	+200	5.9	1.7	0.06	50
907	500	2.3	32	+200	6.6	2.3	0.05	42
908	280	3.6	24	+200	6.0	3.2	0.06	39
910	370	1.5	29	180	5.9	2.5	0.07	30
911	265	1.7	32	12	7.6	4.0	0.07	46
912	270	1.6	31	25	7.3	4.5	0.08	45
913	365	6.6	33	28	7.1	4.8	0.12	41
914	185	6.0	120	68	5.2	4.0	0.13	67
915	225	7.8	110	82	5.3	4.5	0.16	58
916	250	7.0	110	110	6.4	+5.0	0.17	63
917	230	7.6	105	62	6.0	4.6	0.15	62
918	170	6.8	140	22	5.2	3.1	0.14	74
919	185	1.9	175	30	5.8	+5.0	0.09	92
920	295	6.2	49	30	6.3	3.1	0.15	46
921	275	4.7	29	25	6.4	2.3	0.11	40
922	355	6.6	31	28	7.9	4.0	0.12	42
923	355	6.4	58	27	7.5	4.6	0.18	47
924	310	4.4	25	27	6.2	3.3	0.10	36
925	330	5.2	52	28	6.7	4.0	0.16	45
926	290	5.6	50	60	6.3	3.0	0.12	45
927	315	5.4	54	62	6.0	4.6	0.12	45
928	370	4.4	62	26	5.8	4.7	0.06	51
929	375	4.0	72	175	5.7	2.0	0.11	45
930	205	4.9	150	29	4.5	+5.0	0.08	74
931	335	5.2	180	35	5.7	4.8	0.12	86
932	375	3.7	170	52	4.9	4.0	0.11	76
933	140	5.2	330	58	4.3	4.3	0.14	82
934	140	6.6	310	78	4.7	+5.0	0.16	90
935	345	6.6	92	21	5.8	3.7	0.13	47
936	270	3.6	90	33	6.5	4.0	0.10	46
937	195	3.4	86	125	6.1	3.1	0.11	46
938	240	6.4	160	43	5.9	3.7	0.11	88
939	110	5.6	330	54	5.2	+5.0	0.11	92
940	180	5.4	320	46	4.4	+5.0	0.12	94
941	240	4.5	98	54	5.0	+5.0	0.11	54
942	155	4.5	300	49	4.8	+5.0	0.12	84
943	265	6.0	120	52	5.8	+5.0	0.12	66
944	380	2.7	100	25	6.2	+5.0	0.08	45
945	265	5.0	82	23	5.6	2.4	0.11	43
946	310	1.9	84	29	4.5	2.9	0.06	44
947	300	1.8	88	47	5.4	2.3	0.06	40
948	450	5.2	98	72	6.6	4.5	0.13	45
949	220	1.5	84	22	6.6	4.5	0.04	48
950	175	1.5	96	16	5.9	3.9	0.05	47
951	335	5.4	90	31	5.6	3.1	0.12	44
952	265	4.7	115	19	6.2	2.4	0.15	26

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
70770953	325	2.1	94	50	6.7	3.7	0.07	47
954	400	5.4	74	33	6.4	4.1	0.12	47
955	330	4.6	90	33	5.8	+5.0	0.10	46
956	320	5.4	94	34	6.2	4.7	0.12	54
957	290	5.6	35	17	6.4	2.7	0.15	40
958	255	4.2	32	28	6.0	2.4	0.10	39
959	250	5.0	12	21	6.2	2.9	0.15	27
960	315	3.1	20	60	6.3	4.7	0.11	29
961	355	5.2	41	39	6.5	4.7	0.13	41
962	300	6.6	12	19	7.1	3.4	0.18	31
963	260	4.9	13	32	6.8	4.3	0.13	30
964	440	4.3	31	34	7.8	3.5	0.17	41
965	410	8.0	34	34	+8.0	2.4	0.22	51
966	155	2.0	36	185	7.4	+5.0	0.08	47
967	130	1.0	13	30	6.0	+5.0	0.06	27
968	205	6.6	140	24	5.4	4.3	0.15	63
969	185	6.4	140	41	4.9	4.5	0.11	68
970	200	6.0	160	44	5.2	3.1	0.12	71
971	210	6.6	165	43	4.9	2.9	0.11	74
972	355	4.3	200	56	5.5	4.0	0.12	85
973	310	5.6	270	50	4.9	2.7	0.10	105
974	235	7.6	180	72	6.4	+5.0	0.15	77
975	200	6.8	150	35	5.4	3.4	0.13	72
976	235	6.8	220	16	5.7	4.8	0.15	120
977	285	6.0	300	50	5.2	4.3	0.09	125
978	300	2.0	210	60	6.4	4.0	0.07	92
979	350	7.8	330	64	6.4	+5.0	0.18	135
980	300	4.0	200	64	5.3	4.0	0.11	100
981	290	5.6	210	39	5.2	3.1	0.13	110
982	420	2.7	230	64	5.9	2.1	0.07	94
983	245	4.7	250	47	4.7	2.5	0.15	120
984	230	3.1	300	54	5.3	4.6	0.11	125
985	285	5.8	130	43	5.2	2.5	0.15	56
986	345	6.4	130	52	6.0	3.5	0.16	58
987	310	4.9	125	41	5.8	2.8	0.16	55
989	325	6.0	130	46	5.5	3.1	0.17	58
990	210	3.2	82	9	5.1	2.7	0.15	44
991	175	5.8	110	62	5.3	3.4	0.13	73
992	370	4.1	80	21	4.8	3.0	0.15	48
993	190	7.6	145	32	5.0	4.4	0.14	73
994	190	6.8	155	33	5.3	4.2	0.13	75
995	180	2.6	80	11	5.2	2.5	0.15	44
996	175	6.4	115	64	5.8	4.4	0.13	77
997	175	5.8	140	58	5.3	3.3	0.12	75
998	180	6.6	180	76	5.2	3.9	0.13	82
999	510	3.1	120	29	6.7	3.1	0.31	63

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)	Ni (ppm)
70772000	700	5.2	150	42	6.7	3.7	0.17	69
2001	520	5.0	165	46	5.4	+5.0	0.19	66
2002	350	4.3	30	38	6.6	3.9	0.14	40
2003	270	6.0	38	19	6.7	3.3	0.18	42
2004	380	5.2	36	36	6.4	3.5	0.13	43
2005	290	6.4	32	29	6.4	3.5	0.16	41
2006	305	5.6	25	19	6.7	3.0	0.17	37
2007	315	6.4	39	17	6.7	+5.0	0.17	43
2008	305	5.4	23	18	6.2	3.3	0.17	34
2009	270	5.8	74	18	6.1	3.4	0.18	48
2010	295	5.2	62	38	6.1	3.4	0.17	46
2011	255	4.1	21	64	5.5	2.6	0.14	33
2012	315	5.2	68	52	6.4	3.8	0.17	49
2013	295	3.5	68	98	5.4	4.2	0.11	47
2014	265	5.0	66	25	5.4	2.8	0.17	47
2016	255	6.2	25	27	6.0	3.1	0.13	44
2017	230	5.4	22	18	6.2	2.1	0.15	40
2018	240	4.7	33	23	6.0	2.5	0.13	46
2019	380	2.3	42	48	6.0	+5.0	0.07	39
2020	385	3.8	24	40	5.4	3.3	0.08	37
2021	265	5.6	33	30	6.7	3.1	0.16	44
2022	255	4.3	29	25	5.8	2.9	0.10	43
2023	215	1.5	32	58	6.8	4.2	0.07	45
2024	255	6.4	21	24	6.0	3.2	0.14	40
2025	215	6.8	115	33	5.4	4.4	0.12	49
2026	270	0.8	78	125	6.4	+5.0	0.05	57
2027	280	5.4	34	23	6.0	3.0	0.15	40
2028	320	4.1	41	74	6.1	3.2	0.09	51
2029	290	4.6	36	36	6.9	3.1	0.16	49
2030	280	5.4	36	21	5.6	2.3	0.12	39
2031	195	5.2	110	41	4.9	3.3	0.08	71
2033	195	6.4	110	72	5.0	3.3	0.10	71
2034	230	5.0	115	36	4.3	4.1	0.09	70

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
69770104	49	180	0.64	280	35	140
107	34	205	0.41	195	24	-100
112	39	155	0.66	273	29	135
114	40	200	0.86	278	35	195
116	36	165	0.66	238	29	130
117	38	180	0.84	270	40	190
118	42	185	+1.00	373	56	255
137	36	280	0.50	218	28	110
140	32	185	0.45	198	21	-100
142	33	235	0.58	238	26	110
70770248	34	245	+1.00	403	34	205
265	34	185	0.50	220	24	-100
269	37	140	0.74	370	30	130
270	33	265	0.50	193	32	130
376	35	130	0.70	243	32	135
377	31	200	0.86	273	30	160
537	42	210	0.78	290	34	135
539	35	155	0.60	228	39	135
542	34	155	0.78	283	32	120
545	36	175	0.70	303	29	135
550	37	190	0.74	320	30	135
557	29	110	0.36	183	20	-100
558	30	110	0.33	175	23	-100
560	29	200	0.38	188	22	-100
567	38	220	0.60	250	33	135
571	36	135	0.64	270	30	130
574	40	185	0.58	268	25	130
576	38	155	0.76	303	33	185
581	37	225	0.52	215	30	125
582	37	210	0.44	190	35	130
584	34	140	0.50	195	26	105
587	35	140	0.50	198	30	115
589	35	140	0.52	195	29	120
592	36	140	0.48	210	28	115
594	36	245	0.60	243	28	130
596	36	235	0.52	233	26	105
599	36	215	0.90	348	32	200
601	35	145	0.78	328	31	180
612	34	165	0.70	263	27	150
614	36	185	0.76	288	30	165
750	23	62	0.33	155	33	-100
751	36	185	0.78	330	31	175
752	34	175	0.54	210	27	125
753	35	115	0.58	243	28	125
754	32	210	0.54	220	25	110
755	35	240	0.54	225	28	110
756	35	250	0.54	235	19	110
757	35	165	0.70	258	32	160
758	34	210	0.56	230	21	105

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
70770760	36	165	0.56	235	25	100
761	35	175	0.72	205	30	180
763	39	310	0.56	233	36	125
764	39	150	0.58	250	41	155
765	38	175	0.58	243	32	130
766	45	185	0.56	233	72	205
767	38	260	0.62	263	30	135
768	40	290	0.56	223	44	140
769	38	200	0.72	283	31	130
770	35	60	0.56	213	41	175
771	39	220	0.52	238	32	110
772	38	165	0.68	245	29	160
773	39	210	0.62	260	30	130
774	37	150	0.58	245	36	130
775	36	125	0.66	250	32	145
776	39	135	0.66	258	32	120
777	35	145	0.64	240	33	135
778	37	105	0.58	228	34	135
779	37	185	0.56	253	31	130
780	37	195	0.74	293	33	140
781	37	180	0.60	258	31	135
782	36	170	0.70	260	29	125
783	37	115	0.56	225	80	230
784	37	155	0.72	265	30	145
785	37	175	0.62	240	30	145
790	35	150	0.58	240	28	115
791	36	165	0.68	255	32	160
792	40	140	0.60	263	39	125
793	35	54	0.84	278	33	195
794	36	180	0.82	300	30	165
795	30	62	0.78	273	31	180
796	36	195	0.56	230	35	145
797	36	260	0.54	253	32	135
798	34	130	0.39	183	29	-100
799	33	275	0.41	205	27	-100
800	35	190	0.68	263	29	130
801	33	150	0.39	188	27	-100
802	31	140	0.42	195	23	-100
803	37	195	0.96	303	42	230
804	36	160	0.84	263	39	205
805	33	205	0.43	208	27	-100
806	39	155	0.86	260	50	235
807	39	160	0.72	250	48	215
808	41	155	0.76	263	50	245
809	32	360	0.39	240	25	-100
810	38	155	0.74	323	30	145
811	33	145	0.40	210	24	-100
812	39	175	0.60	210	44	185
813	39	170	0.86	278	37	210

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
70770814	33	135	0.40	185	22	-100
815	40	125	0.86	283	47	230
816	43	205	0.82	255	72	255
817	33	130	0.46	183	23	-100
818	37	130	0.58	235	30	100
819	38	170	0.52	210	30	100
820	37	170	0.60	225	30	125
821	35	150	0.62	258	24	110
822	39	205	0.62	250	29	115
823	41	185	0.78	335	29	130
824	35	140	0.52	228	21	-100
825	35	170	0.66	275	22	125
826	39	160	0.74	303	34	150
827	37	160	0.68	280	31	135
829	33	165	0.41	193	23	-100
830	38	165	0.88	305	34	200
832	40	145	0.78	310	33	160
833	40	145	0.64	245	32	135
834	39	255	0.70	278	26	125
835	38	230	0.78	293	29	140
836	38	145	0.72	268	33	155
837	38	180	0.64	258	29	-100
838	36	160	0.36	195	25	-100
839	36	185	0.45	213	22	-100
840	36	220	0.45	228	21	-100
841	49	165	0.88	288	36	215
842	16	235	0.07	68	26	-100
843	20	240	0.10	96	42	-100
844	23	210	0.12	125	43	-100
845	34	110	0.54	238	32	125
846	40	195	0.60	248	29	135
847	37	190	0.56	243	40	145
848	37	150	0.50	210	37	145
849	39	205	0.50	210	46	155
850	36	180	0.58	248	30	135
851	36	165	0.49	218	25	105
852	32	115	0.39	185	20	-100
853	35	175	0.49	240	24	-100
854	35	150	0.47	218	25	-100
855	40	230	0.58	240	39	149
856	34	140	0.44	198	28	-100
857	35	155	0.52	213	37	130
858	36	155	0.60	235	35	140
859	36	310	0.80	278	31	160
860	38	180	0.58	240	30	115
861	36	150	0.90	350	36	195
862	41	270	0.60	308	35	150
863	44	170	0.54	223	30	130
864	35	175	0.78	265	34	190

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
70770865	39	185	1.00	335	34	195
866	37	180	0.94	313	39	210
867	41	215	0.88	303	50	220
868	36	195	0.90	325	31	185
869	34	175	0.70	245	39	195
870	34	200	0.56	225	27	105
871	34	175	0.58	258	32	135
872	36	145	0.56	230	31	120
873	38	165	0.80	318	36	210
874	35	165	0.56	243	28	115
875	35	180	1.00	345	39	240
488	41	195	0.64	243	38	175
493	39	160	0.84	290	34	190
496	37	205	0.78	293	33	195
501	38	245	1.00	358	29	175
507	39	205	1.00	378	31	180
512	33	120	0.56	215	25	115
513	34	160	0.62	233	27	140
514	32	135	0.54	213	24	105
515	34	130	0.50	203	26	100
517	36	235	0.58	233	28	110
518	36	265	0.50	235	24	100
521	38	300	0.70	280	29	165
786	36	225	0.68	275	26	120
787	42	200	0.66	253	40	165
788	39	245	0.96	333	30	145
789	37	140	0.82	290	30	145
828	38	270	0.78	285	29	125
831	37	180	0.86	348	29	140
900	35	50	0.92	265	52	230
901	36	125	0.72	230	34	170
902	36	140	0.68	228	34	160
903	36	175	0.92	280	40	195
904	46	470	+1.00	403	37	205
905	43	200	0.86	315	56	270
906	29	62	0.72	353	40	215
907	34	52	0.94	353	50	215
908	38	76	0.88	290	58	255
910	35	78	0.76	250	60	255
911	43	160	0.80	306	70	270
912	38	150	0.88	323	39	230
913	41	195	0.88	330	34	205
914	36	145	0.54	228	24	115
915	38	205	0.62	258	26	125
916	39	190	0.70	275	26	155
917	39	185	0.70	263	25	145
918	36	170	0.50	225	25	120
919	38	150	0.60	235	46	195
920	39	190	0.94	375	33	195

Sample No.	So (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
70770921	38	185	0.78	300	30	190
922	43	225	1.00	368	40	220
923	39	205	0.96	385	33	205
924	39	155	0.72	290	36	205
925	39	185	0.88	355	36	205
926	38	195	0.86	345	31	200
927	38	210	0.92	353	32	195
928	45	260	0.68	293	66	220
929	41	210	0.82	298	44	235
930	32	185	0.41	220	28	115
931	34	175	0.70	283	27	145
932	32	185	0.68	253	25	145
933	39	175	+1.00	210	54	120
934	39	190	0.47	225	54	120
935	35	190	1.00	328	35	205
936	35	140	0.96	308	38	210
937	33	160	0.88	275	36	205
938	48	260	0.68	500	72	230
939	36	145	0.48	215	30	-100
940	45	270	0.46	238	66	125
941	34	165	0.74	285	25	125
942	37	140	+1.00	213	22	-100
943	38	185	0.64	283	28	130
944	39	185	+1.00	355	30	230
945	35	160	0.76	280	29	175
946	37	120	0.74	260	52	195
947	35	115	0.84	275	29	180
948	36	200	+1.00	298	33	210
949	38	78	0.72	240	56	205
950	36	120	0.82	260	35	180
951	34	180	0.84	278	27	160
952	35	145	0.84	278	30	170
953	35	120	+1.00	283	36	215
954	34	210	+1.00	308	34	190
955	37	230	0.96	305	31	180
956	36	255	0.88	290	29	180
957	38	200	0.82	315	29	190
958	36	150	0.70	285	29	170
959	37	155	0.90	308	29	180
960	36	130	0.94	315	30	180
961	41	190	0.94	350	31	180
962	43	235	+1.00	333	32	205
963	41	180	0.82	288	41	210
964	42	165	+1.00	438	43	255
965	48	320	+1.00	510	68	330
966	48	92	0.88	395	52	299
967	39	64	0.90	338	30	180
968	35	170	0.60	270	22	120
969	34	150	0.49	220	21	-100

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
70770970	35	140	0.56	218	28	130
971	38	185	0.54	223	30	115
972	48	210	0.50	245	58	215
973	48	235	0.49	233	62	225
974	39	175	0.78	275	29	155
975	37	160	0.54	225	27	130
976	36	170	0.52	220	31	140
977	35	185	0.54	213	30	120
978	36	125	0.60	275	35	130
979	41	400	0.54	238	20	140
980	46	270	0.80	285	66	260
981	42	230	0.45	203	54	170
982	41	275	0.62	228	40	180
983	40	210	0.56	230	40	150
984	40	255	0.68	260	35	145
985	34	170	0.74	268	31	195
986	35	170	0.80	260	32	195
987	34	155	0.78	250	30	190
989	36	180	0.78	263	33	190
990	37	82	0.82	275	38	230
991	37	125	0.52	215	27	115
992	39	190	0.74	245	41	240
993	38	145	0.60	245	26	115
994	36	135	0.58	230	28	120
995	35	98	0.84	230	33	245
996	37	128	0.54	210	32	115
997	36	130	0.54	205	25	110
998	34	135	0.54	215	27	-100
999	35	285	0.86	250	40	210
70772000	34	340	0.98	270	40	200
2001	34	310	0.84	290	31	160
2002	39	160	0.80	310	30	180
2003	38	180	0.86	350	34	170
2004	41	195	0.84	320	32	180
2005	40	190	0.80	325	32	185
2006	41	165	+1.00	385	32	210
2007	42	190	0.82	315	36	195
2008	39	155	0.82	320	31	185
2009	40	185	0.82	350	30	175
2010	41	210	0.84	340	36	205
2011	36	125	0.72	280	27	170
2012	39	190	0.92	355	30	185
2013	40	190	0.94	360	32	200
2014	37	150	0.76	315	29	170
2016	44	170	0.68	260	38	170
2017	42	165	0.66	240	39	195
2018	39	135	0.78	280	35	185
2019	39	175	+1.00	355	32	180
2020	42	160	0.74	265	42	180

Sample No.	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
70772021	39	175	0.86	320	29	165
2022	38	150	0.72	280	34	170
2023	38	86	0.82	265	40	180
2024	41	170	0.82	295	31	160
2025	38	175	0.58	235	28	120
2026	38	68	0.62	235	34	145
2027	37	160	0.84	300	32	185
2028	43	195	0.76	275	58	230
2029	41	160	0.84	310	36	175
2030	39	170	0.92	320	33	190
2031	37	140	0.52	215	35	125
2033	35	145	0.52	215	29	105
2034	35	150	0.58	235	30	115

ANALYSIS OF SEDIMENTS FROM INTERTIDAL THERMAL
AREAS, TALASEA, NEW BRITAIN

by

S.E. Smith and T.I. Slezak

20 samples of sand and mud from intertidal thermal areas at Talasea, New Britain, submitted by J. Ferguson, were analysed by optical emission spectroscopy on the Hilger and Watts 3 metre Polychromator for Ba, Ca, Co, Cr, Cu, Fe, La, Mg, Mn, Ni, Sc, Sr, Ti, V, Y, and Zr. The samples were ignited at 1000°C for 4 hours. The results are on the basis of ignited material.

The analytical method used was adapted from Ahrens and Taylor ("Spectrochemical Analysis", 1961, p. 189, Addison - Wesley Publishing Company). One part of sample was mixed with two parts of graphite (National Carbon Company Type L4160, Grade SP-2). The mix was loaded into a preformed graphite electrode (National Carbon Company Type L4206) and arced as the anode at a constant 8 amps D.C. for 130 seconds. Both internal standard and rock standard control were used.

Sample No.	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	La (ppm)	Mg (%)
70800084	360	0.7	18	58	66	6.6	-50	1.1
085	400	0.3	11	46	46	8.4	-10	1.0
086	305	1.4	9	38	28	7.9	-50	0.5
087	270	1.9	9	58	30	9.8	-50	1.1
088	220	3.9	14	33	34	6.1	-50	2.2
089	160	4.7	17	36	56	6.2	-50	3.0
090	260	4.0	13	21	38	5.5	-50	2.7
091	250	4.6	10	34	35	4.6	-50	2.0
092	300	3.6	8	27	24	4.0	-50	1.5
093	170	0.3	21	37	80	2.8	-50	0.6
094	1300	1.6	11	29	54	+10.0	-50	0.8
095	185	0.8	-8	11	39	+10.0	-50	-0.2
096	165	0.6	8	12	11	+10.0	-50	0.3
097	800	0.4	8	20	43	+10.0	-50	-0.2
098	+5000	1.1	-8	150	36	4.0	-50	0.4
099	520	1.1	17	78	115	4.8	-50	0.3
100	120	0.7	14	39	150	6.4	-50	0.9
101	870	1.1	11	64	27	5.7	-50	0.5
102	940	3.7	-8	43	68	8.2	-50	0.7
LS 18	145	3.4	45	100	50	9.7	-50	2.0

Sample No.	Mn (%)	Ni (ppm)	Sc (ppm)	Sr (ppm)	Ti (%)	Y (ppm)	V (ppm)	Zr (ppm)	Loss on ignition (%)
70800084	0.05	23	35	155	0.54	23	190	110	19.27
085	0.04	12	30	180	0.36	22	170	-100	13.29
086	0.03	13	26	200	0.30	26	140	130	11.29
087	0.04	14	30	230	0.39	21	210	-100	11.87
088	0.08	13	28	300	0.33	17	140	-100	4.25
089	0.10	13	29	240	0.36	20	140	-100	3.48
090	0.09	10	25	310	0.40	25	130	-100	5.09
091	0.09	-8	23	340	0.36	16	130	-100	4.55
092	0.07	9	20	310	0.32	13	105	-100	3.84
093	0.03	27	27	78	0.50	21	120	140	23.07
094	0.08	13	23	225	0.24	31	80	-100	14.27
095	-0.02	10	9	105	0.05	20	22	-100	23.10
096	0.09	13	9	170	0.52	34	430	-100	16.40
097	0.03	10	20	115	0.11	23	60	-100	16.91
098	0.02	10	29	315	0.44	13	310	-100	12.28
099	-0.02	-8	33	195	0.46	21	160	100	23.36
100	-0.02	17	34	145	0.70	33	280	140	18.52
101	0.02	13	32	190	0.40	25	190	-100	13.61
102	0.02	17	22	550	0.25	20	125	-100	26.36
LS18	0.09	32	41	225	0.63	28	280	-100	13.13

ANALYSIS OF AMPHIBOLITES AND
SANDSTONES FROM MOUNT ISA AREA

by

S.E. Smith and T.I. Slezak

41 samples of amphibolites and sandstones from Mount Isa area, submitted by A.Y. Glikson, were analysed by optical emission spectroscopy on the Hilger and Watts 3 metre Polychromator for Ba, Ca, Cr, Cu, Fe, Mg, Mn, Ni, Sc, Sr, Ti, V, Y, and Zr.

The analytical method used was adapted from Ahrens and Taylor ("Spectrochemical Analysis", 1961, p. 189, Addison-Wesley Publishing Company). One part of sample was mixed with two parts of graphite (National Carbon Company Type L4160, Grade SP-2). The mix was loaded into a preformed graphite electrode (National Carbon Company Type L4206) and arced as the anode at a constant 8 amps D.C. for 130 seconds. Both internal standard and rock standard control were used.

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)
70201001	165	8.8	22	74	6.6	3.3	0.18
1003	175	5.6	16	135	5.8	2.4	0.15
1005	375	6.8	42	80	4.5	2.5	0.19
1007	210	5.6	145	215	6.6	2.9	0.18
1008	135	6.8	155	230	6.0	3.0	0.15
1009	80	8.0	105	62	6.6	3.8	0.19
1010	115	9.0	400	10	4.9	+5.0	0.15
1011	370	6.2	110	115	7.8	3.5	0.21
1012	170	4.7	94	56	7.8	3.5	0.21
1014	265	5.0	62	240	7.0	2.2	0.18
1019	155	4.2	78	86	7.6	3.8	0.25
1020	205	6.0	16	39	7.8	1.5	0.14
1021	165	+10.0	78	115	7.8	2.7	0.23
1024	84	3.7	76	50	7.0	2.1	0.14
1027	530	5.2	160	86	6.2	2.2	0.17
1028	690	3.6	49	62	2.3	1.4	0.11
1032	250	6.4	115	215	6.6	3.4	0.18
1035	410	5.6	100	40	6.2	4.4	0.20
1036	500	5.8	74	210	6.6	+5.0	0.17
1037	575	4.2	22	190	7.0	2.1	0.16
1038	240	4.0	13	180	7.6	2.0	0.14
1039	620	3.0	62	10	4.9	2.1	0.13
1048	290	6.2	34	105	6.6	2.1	0.17
1059	275	5.4	28	76	7.8	2.1	0.16
1063	96	6.4	150	24	5.8	1.2	0.13

Sample No.	Ba (ppm)	Ca (%)	Cr (ppm)	Cu (ppm)	Fe (%)	Mg (%)	Mn (%)
1064	50	3.0	45	11	2.8	1.4	0.09
1067	100	6.2	195	125	5.4	3.2	0.13
1069	125	6.6	70	145	7.4	3.7	0.20
1072	66	5.4	345	105	7.0	+5.0	0.17
1075	470	8.4	140	300	6.6	5.0	0.21
1025	140	5.4	80	18	7.2	3.3	0.13
1031	300	0.3	22	12	-0.5	-0.2	-0.03
1040	720	0.3	40	8	1.5	0.3	0.06
1041	2200	0.2	105	43	-0.5	-0.2	-0.03
1045	490	6.0	49	9	2.0	-0.2	0.05
1049	800	1.4	46	36	1.9	0.5	0.06
1051	760	0.3	25	10	-0.5	-0.2	-0.03
1053	610	0.5	23	20	1.0	0.3	-0.03
1054	1320	0.3	49	10	1.4	-0.2	-0.03
1057	550	0.3	27	14	0.9	0.2	-0.03
1061	1060	0.3	86	7	1.8	0.5	-0.03

Sample No.	Ni (ppm)	Sc (ppm)	Sr (ppm)	Ti (%)	W (ppm)	Y (ppm)	Zr (ppm)
70201001	86	39	360	0.86	325	49	270
1003	72	35	165	0.80	245	45	280
1005	62	43	220	0.60	245	50	220
1007	74	40	140	0.98	300	43	215
1008	78	37	150	1.00	300	44	190
1009	88	39	220	1.10	320	41	105
1010	250	32	340	0.39	150	21	-100
1011	90	40	210	1.17	285	54	285
1012	64	43	145	1.57	340	54	300
1014	60	39	140	1.46	325	54	305
1019	74	40	94	1.70	355	64	300
1020	28	35	240	1.66	100	84	440
1021	66	41	225	1.82	370	62	295
1024	68	42	110	0.66	340	58	230
1027	68	37	190	1.90	415	72	500
1028	32	15	115	0.38	115	29	310
1032	115	36	170	0.96	260	31	155
1035	76	38	185	0.88	300	31	130
1036	92	39	175	0.78	285	30	105
1037	50	38	200	1.00	330	46	215
1038	24	32	140	1.60	96	78	400
1039	48	23	82	0.96	185	44	305
1048	42	34	200	0.98	200	56	245
1059	41	34	200	1.35	245	50	250
1063	105	32	295	1.77	345	62	475
1064	42	19	62	0.36	140	34	250
1067	97	37	120	0.66	290	24	-100
1069	68	44	155	0.62	290	30	-100

Sample No.	Ni (ppm)	Sc (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Y (ppm)	Zr (ppm)
1072	195	37	265	0.74	245	33	-100
1075	68	43	245	0.72	305	24	-100
1025	60	39	165	1.60	325	54	275
1031	19	-10	- 10	0.05	29	35	-100
1040	38	-10	74	0.39	90	30	410
1041	21	17	- 10	0.78	135	31	320
1045	20	13	440	0.24	43	30	255
1049	34	14	145	0.18	60	48	340
1051	23	-10	- 10	0.05	30	34	-100
1053	35	11	60	0.11	43	31	140
1054	23	-10	- 10	0.16	44	29	205
1057	22	-10	- 10	0.20	64	29	145
1061	39	12	- 10	0.27	62	28	320