

62/142
c. 3

Head Office Library Copy.
File 198 Q/10
Folio 128

COMMONWEALTH OF AUSTRALIA.

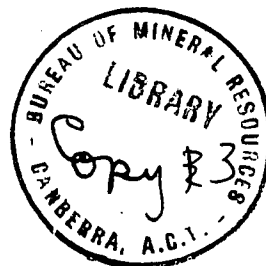
DEPARTMENT OF NATIONAL DEVELOPMENT.
BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

1962/142

NON-LENDING COPY
NOT TO BE REMOVED
FROM LIBRARY

500948



INTERIM REPORT ON REGIONAL GEOCHEMICAL DRAINAGE
SAMPLING IN THE CHILLAGOE - HERBERT RIVER GORGE AREA,
NORTH QUEENSLAND, 1961.

by

D.O. Zimmerman and E.J. Howard

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 It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

Interim Report on Regional Geochemical Drainage
Sampling in the Chillagoe - Herbert River Gorge Area,
North Queensland, 1961.

by

D.O. Zimmerman and E.J. Howard.

500948

Records 1962/142

CONTENTS

	<u>Page</u>
SUMMARY	1
INTRODUCTION	1
PHYSICAL PROPERTIES OF THE AREA	1
GENERAL GEOLOGY OF THE AREA	2
SAMPLING TECHNIQUES	2
ANALYTICAL TECHNIQUES	3
RESULTS	4
FUTURE WORK	7
CONCLUSIONS	7
REFERENCES	8
APPENDIX - ANALYTICAL RESULTS	9

PLATES

1. Chillagoe - Mt. Garnet Area.
2. Mt. Garnet - Herbert River Gorge Area.
3. Herbert River Gorge Area.

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 It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

Interim Report on Regional Geochemical Drainage
Sampling in the Chillagoe - Herbert River Gorge Area,
North Queensland, 1961.

SUMMARY

A total of 926 localities in the drainage in the Chillagoe - Herbert Gorge area were sampled. The minus 80 fraction was retained for analysis. Spectrographic analyses for Ni, Co, Zn, Cu, V, Sn, Mo, Pb, Be and Ag were carried out, and many samples were found to contain elements in concentrations higher than average. High values of Ni, Co and V and low values of Pb tend to indicate proximity to basalt, whereas the reverse indicates granitic areas. Of the various anomalous areas found, the area along the edge of the Herbert River Gorge, north of Princess Hills homestead, appears most interesting. Here Zn, Cu, V, Sn, Mo, and Pb are present in amounts higher than background over an area of about 6 square miles. Mineralization is known near Princess Hills and further sampling will be carried out in this and other areas during the 1962 field season.

INTRODUCTION

The 1961 regional geochemical programme was begun with the aim of testing the Chillagoe-Almaden area to locate any large areas of low grade mineralization of the "porphyry copper" type. Immediately prior to the field season, Enterprise Exploration Pty.Ltd., decided to carry out a similar programme in the same area. It was then decided that the Bureau party should carry out sampling outside the Chillagoe-Almaden area, concentrating on a zone from Almaden to Mt. Garnet, and on the Cashmere-Herbert River Gorge area. A few samples were also to be taken within the original area, so that some correlation of the results of the two surveys might be achieved.

The field party consisted of D.O. Zimmerman and C.D. Branch (geologists), E.J. Howard (chemist), and M.J. Dando, A.G. Pygott, and L.P. Black (samplers). Work began in June 1961, and finished on 14th October, 1961.

PHYSICAL PROPERTIES OF THE AREA.

The elevation of the area covered by the survey ranges from 1400 to 2400 feet above sea level. The area spans the divide between easterly drainage - the Herbert River, and westerly drainage - the Tate and Walsh Rivers. Annual rainfall averages between 30 and 40 inches, and the south-eastern part of the area receives slightly more rainfall than the north-western (Chillagoe) section. Most of the rain falls during a midsummer wet season. The average temperature range is 95°F maximum and 55°F minimum; frosts occur occasionally in the Mt. Garnet - Herbert River Gorge area.

The climatic type over the greater part of the area is "tropical highland", although around Chillagoe and Fischerton the climate is classified as the "tropical inland" type.

Vegetation varies slightly over the area with the climatic type and elevation. In the Chillagoe area vegetation is sparse and stunted, and trees are mainly eucalypts. South of Mt. Garnet and east of the divide the vegetation is more dense, and large trees, particularly ironbarks and stringy barks, are common. She-oaks grow along watercourses. There are small patches of rain forest in the Herbert River Gorge area; some of the streams in this area carry permanent water, whereas this is very rare west of the divide. In the latter area soil cover is usually quite thin and because of the sparse vegetation, rain water run-off is rapid.

GENERAL GEOLOGY OF THE AREA

The geology of the area has been described by White (1961) and Best (1961). The area is occupied mainly by two types of granite - the older, grey Herbert River Granite and the slightly younger, pink Elizabeth Creek Granite with its associated acid extrusive rocks. Both granites are of Upper Carboniferous age. Precambrian granites and metamorphic rocks crop out along the western side of the area and at isolated localities south of Mt. Garnet. There are also small roof pendants of Silurian sediments, greywackes, siltstones and rare limestones, throughout the area. During Tertiary and Recent times extensive outpourings of basaltic lava occurred in the Herbert River Gorge area. The Herbert River has subsequently eroded down through the basalt cap in the gorge area to a depth of 1200 feet. This rapid cutting back of the stream is thought to be due to recent block faulting in the Cairns-Townsville coastal area.

SAMPLING TECHNIQUES

Sampling was carried out in the drainage channels of the area because the sediments there should give a measure of the metal content of the adjacent watershed. Sediments collected in the beds of streams were sieved through an 80-mesh nylon screen mounted in a 2" diameter tubular steel frame. The minus 80 fraction was retained and used for the analyses. At most localities a sample was taken from alluvium in the banks of the stream as well as in the stream bed. The alluvial banks invariably contain a much higher proportion of fines than the stream bed; consequently the time taken to sieve the required amount of sample from the banks is much less than for the beds. Complete spectrochemical analyses of 'bank' and 'bed' samples are not yet available, and a statistical comparison is therefore not possible. However, field analyses of 'bed' and 'bank' samples from approximately 100 localities indicate that the metal content of the 'bank' sample is generally equal to, and frequently higher than, that of the 'bed' sample. In future work both types of samples will be taken at every sampling locality until such time as the bank samples are proved to be thoroughly reliable. If a single bank sample proves sufficient at each locality, sampling time will be greatly reduced thereby allowing a greater area to be tested in the time available.

Some streams and rivers up to 300 feet wide were sampled during the present survey. In these streams samples were taken from each bank and, usually, from three points across the bed of the stream.

3.

Stream bed samples are always taken from various parts of the bed rather than a single point, in order to obtain a more representative sample. In future work it is recommended that sampling should be confined to smaller streams in order to eliminate the dilution factor present in large watercourses.

After sieving, the samples were stored in plastic bags measuring 9 inches by 3 inches. A small aluminium tag showing the sample number and photo code was included in the bag which was then rolled up and sealed with a rubber band in such a way that the notations on the aluminium tag are visible. The photo code consists of three numbers - e.g., E-2-5091 or A-10-5172. The letters E and A refer respectively to the Einasleigh and Atherton 4 mile areas. The second figure (2 and 10) refers to the photo run, and the third number is the number of the photo covering the area where the sample was taken. The sample points are recorded on the photos by pricking through and writing on the back of the photo.

The sampling interval used during the survey was not constant. Depending on the spacing of the samples it is possible to sample up to 40 localities per man per day. A total of 926 localities were sampled during the survey.

ANALYTICAL TECHNIQUES

An attempt was made to carry out the analyses in a mobile laboratory in the field base camp. The total - extractable-heavy-metals method was used, but it proved difficult to apply, and the results gave a measure of the combined zinc and copper content only. The method was finally abandoned, and all samples were returned to Canberra for spectrographic analysis. Some delay occurred in Canberra due to other work, but a complete set of results for stream bed samples was available in late March, 1962.

A Hilger Large Quartz spectrograph was used, and semiquantitative results were obtained. Approximately 20 mg. of sample were arced to completion using a 12-micron slit and 10 amp. arc. The anode excitation method was followed.

The results were recorded on Ilford No. 50 plates, and the following lines were used to determine each element:

Ni 3492, 3414, 3002, 3003. A.U.
Co. 3453, 3405 A.U.
Zn 3345 A.U.
Cu 3273, 3247, 2961, 2824 A.U.
V. 3185 A.U.
Sn. 3175, 3262, 2839, A.U.
Mo 3170 A.U.
Pb 2833 A.U.
Be 3131, 3130 A.U.
Ag 3383, 3281 A.U.

Estimations were made by Lewis visual comparison with a standard plate using a Judd-Lewis comparator. The standards were prepared by mixing pure compounds of the eight elements in a natural soil base. The standards were from 1% to 10ppm. the interval being a factor 2.15 ($10^{1/3}$).

Analyses were carried out at the rate of about 40 per day.

RESULTS

A complete record of the analytical results is listed numerically in the appendix. The sampling localities and analytical results are shown on the accompanying maps.

The semi-quantitative spectrographic analysis gave results for nickel, cobalt, zinc, copper, vanadium, tin, molybdenum, and lead. It was also possible to determine whether or not beryllium and silver were present. The following table lists the mean value of each element determined, together with the limits of detection and average value for various rock types, as given in the literature. "Most frequent" values recorded in the analyses are also given.

TABLE 1: Average abundance of various elements under consideration in Parts per Million.

	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Ag
Limits of detection	1	1	100	1	5	10	5	10		
Average abundance in igneous rocks (Ahrens & Taylor, 1961, p93)	35	20	40	55	120	2	1	15	2	0.1
Average abundance in basic igneous (Turekian & Wedepohl, 1961) rocks.	130	48	105	87	250	1.5	1.5	6	1	0.1
Average abundance in acid igneous (Turekian & Wedepohl, 1961) rocks.	4.5	1.0	40	10	44	3	1	19	2	.05
Average abundance for area sampled. (-10* taken as 5)	1	4	-	10	40	27	1	58		
"Most frequent" value recorded in analyses.	-10	-10	-	-10	a10 b.100	-10	-10	a50 b10	-	-

* "-10" means "less than 10".

a. For granitic rocks

b. On or near basic rocks.

Each element will be discussed in turn

Nickel and Cobalt.

Both of these elements were commonly not detected. Cobalt is present more often than nickel. Most of the nickel and cobalt values seem to be related to basalt and, less commonly Precambrian rocks. The values probably reflect basic zones in the Precambrian.

Sample 551 from ⁹Offside Creek, north-east of Cashmere, appears anomalous as it was found to contain 100 ppm Ni, 30 ppm Co, and 200 ppm Zn. It may be related to a serpentinite mass in Precambrian rocks under, or protruding through, the basalt in the area.

Zinc

Owing to the poor sensitivity of the spectrographic method for determining zinc, a trace of zinc in the analyses is recorded on the maps with the symbol Zn. The various isolated occurrences may be worth checking. The most interesting anomalous values, other than those near old workings, occur in the Herbert River Gorge area north of Princess Hills homestead. Here several samples give high zinc values as well as high values for copper and lead.

Copper.

Copper values are generally very low except in the vicinity of old workings. Even near mines, e.g., Ruddygore and Gilmore, the high copper values do not seem to persist very far downstream. There are many values of 20 ppm which may be worth following up, depending on the concentrations of associated elements. Most interesting is the Herbert River Gorge area north of Princess Hills. An isolated sample, No. 1162, from near Sunday Creek hut contained 30 ppm Cu and -10ppm * Mo. This may represent mineralization in the Precambrian rocks in that area.

Vanadium

An analysis of the results obtained for vanadium gives in the first instance a broad bimodal distribution. The results were, therefore, divided into two population types, those containing Co (considered as an indicator of derivation from basic rocks) and those not containing Co. A plot of these sets of results gave two normal distribution curves, the former having a most frequent value of 100 and the latter a value of 10.

Table 1. shows that the average vanadium content of basic rocks is 250 ppm, whereas acid igneous rocks average only 45 ppm. The values we obtained from sediments derived from these rocks are, therefore, lower than average.

Samples 1067-1084 show fairly high vanadium values, including a maximum of 700 ppm. These samples were collected around Almaden, in some cases, close to copper-lead, iron, and fluorite mineralization. As vanadium follows ferric iron this may be significant, or the high values may be due to local precipitation of soluble vanadates by organic matter. There may, however, be some relation to the peculiar granite type known as the Almaden Granodiorite, though vanadium rarely exceeds 150 ppm in normal granodiorites (Goldschmidt).

In classifying vanadium anomalies in this area it is well to bear in mind the difference between amounts of the metals in basic rocks and granites.

The area around sample 599, which contains 400 ppm V, 300 ppm Sn 400ppm Pb and 10ppm Mo is to be sampled further, and samples 1067-1084 may also warrant further study.

High values of vanadium occur in the Herbert River Gorge Area in conjunction with high copper, lead and zinc. This area comprises mainly granite, and vanadium must therefore, be considered anomalous.

* "-10" means "less than 10"

Tin

The average value for tin in the area calculated to 22 ppm, mainly because of high values in samples taken near the tin workings, e.g., the Gilmore Mine. Although they are little above background, the values for tin near the Herbert River are interesting, and may be attributable to cassiterite washed downstream from the Mt. Garnet area.

Another interesting area occurs around the Tate River near the junction with the Sandy Tate. Sample 1030A, a bed sample from the Tate River, shows 500 ppm Sn, which is high considering the dilution prevailing in the Tate River. Several samples in this area show appreciable tin values, and further investigation seems justified. Much of the tin could be coming downstream from Koorboora and the Gilmore area; however, Elizabeth Creek Granite occurs nearby, and this could contain a primary source of tin. The possibilities of alluvial tin will also be examined.

It may be possible to study the movement of tin in streams and fossil streams by taking samples of alluvium at regular intervals downstream from the source area.

Molybdenum

Molybdenum is not, or is barely, detectable in the majority of samples. Molybdenum could be significant as an indicator of porphyry copper mineralization. There is some doubt as to the behaviour of molybdenum in drainage systems because the metal was not detected in samples taken from a creek adjacent to molybdenite workings west of Ootann, yet flakes of molybdenite were occasionally visible in the stream bed. Twenty ppm each of copper and molybdenum occur in two streams west of Nymbool (samples 293-4). A molybdenum province seems to exist north east and east of Glen Ruth homestead, and molybdenum is present in the anomalous area north of Princess Hills homestead.

Lead

The 'most frequent' and the average values for lead for the area are above the average values for igneous rocks.

A division, as with vanadium, of the results into two groups - containing Co and not containing Co - gives two log-normal distribution curves. The samples derived from 'basic' rocks give a most frequent value of 10 ppm, whereas from the acid rocks, a result of 50 ppm is obtained. Both values are higher than the quoted averages. Goldschmidt quotes a figure of 100 ppm lead in the lattice of potash feldspar, so the figures may not be abnormally high. Localities 598 and 599 showing 150 ppm Pb and 400 Pb, respectively will be sampled further; sample 599 also contained 400 ppm. V and 300 ppm Sn. Samples 802, 803, and 804, in tributaries of Falls Creek, contain higher than background quantities of Pb, as well as molybdenum and vanadium. In the same area samples 809, 810 and 812 also contain lead above background values. Further sampling will be carried out in the area.

In streams draining mineralization at Ruddygore and Redcap, near Chillagoe, lead appears to have travelled further downstream than copper.

This could be ^{an} apparent effect influenced by the high lead background over the granite in the area.

Most interesting are the high lead values in association with anomalous values of other metals in the area north of Princess Hills.

Beryllium and Silver

Both of these metals were rarely detected in the samples. No semiquantitative measurements were made, but they were detected so rarely that any record of their presence is significant. Beryllium occurs sporadically throughout the area, but most interesting is its occurrence with tin in several samples between Fischerton and Crystal Brook. It is also present in several tributaries of Cameron Creek, north east of Glen Anne homestead.

Silver has been recorded only in samples 1141 and 1160, from the area north of Princess Hills, and a tributary of Sunday Creek, respectively.

FUTURE WORK

More sampling will be carried out ^{some of} over ~~the~~ anomalous areas during the 1962 field season. Sampling will also be directed towards locating tin and beryllium.

CONCLUSIONS

The results of the regional geochemical drainage testing indicate several areas for more detailed investigation. Added advantages as a prospecting tool are speed and economy and a minimum of skilled manpower is necessary.

Estimations for more elements could be obtained, and this would undoubtedly prove advantageous.

The accuracy of the results could be improved by using more refined spectrographic techniques, but this would greatly reduce the advantages of speed and economy.

REFERENCES

- AHRENS, L.H., and TAYLOR, S.R., 1961 - SPECTROCHEMICAL ANALYSIS. Addison - Wesley.
- BEST, J.G., 1961 - Atherton 1:250,000 Geological Series. Bur.Min.Resour.Aust.
Record 1961/78. 55-57/5
- GOLDSCHMIDT, V.M., 1954 - GEOCHEMISTRY. Oxford
- TUREKIAN, K.K., and WEDEPOHL, K.H., 1961 - The distribution of elements in some major units of the earth's crust. Bull.Geol.Soc. Amer., 72(2), 175 - 192.
- WHITE, D.A., 1961 - Geological history of the Cairns - Townsville hinterland. Bur.Min. Resour.Aust., Report No. 59.

APPENDIX:ANALYTICAL RESULTS

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average.
Limits of detection		1	1	200	1	5	10	1	10		
Average value		1	4	-	10	40	27	1	58		
CPDS	1A ⁺	A-7-5029			-10*	10			50		
	2A				-10	10	10		50		
	3A				-10	20	10		20		
	4A				-10	50		-10	50		Mo
	5A				-10	20			50		
	6A				-10	30			50		
	7A				-10	50			100		Pb
	8A				-10	10			20		
	9A				-10	20			50		
	10A				-10	20	70		50		Sn
	11A				-10	30			70		
	12A				-10	20			70		
	13A				-10	20	20		70		Sn
	14A				-10	20	10		100		Pb, Sn
	15A				-10	10			50		
	16A				-10	20			100		Pb
	17A				-10	50-10			100		Pb
	18A				-10	10			150		Pb
	19A				-10	100	50		70		V, Sn
	20A			tr		30			50		Zn
	21A	A-6-5186				20					
	22A				Not analysed						
	23A	A-2-5093			200		-10		30		Cu
	24A			tr	50	100			50		Cu, V, Zn
	25A				-10	70			70		
	26A				-10	50			70		
	27A		10		-10	150			70		V
	28A				-10	70			150		Pb
	29A		-10		10	100			100		V, Pb
	30A					30			100		Pb
	31A					70			100		Pb
	32A					70			70		
	33A					30	50		70		
	34A					20			50		
	35A					20			20		
	36A	A-1-5042				20			50		
	37A					50			70		
	38A				tr	50			50		Zn

* "-10" means "less than 10"
+ A = stream bed sample.

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average value		1	4	-	10	40	27	1	58		
CPDS	39A	A-1-5042	10	tr	50	200			50		Zn, Co, Sn
	40A			tr	10	50			70		Zn
	41A		10	tr		50			50		Co, Zn
	42A				10	50			50		
	43A	A-2-5093			10	20			50		
	44A				10	20			50		
	45A					30	10		50		Sn
	46A				10	20	10		70		Sn
	47A					50			70		
	48A				20	50			100		Cu, Pb
	49A				50	20			70		Cu
	50A					50			50		
	51A					20			50		
	52A			tr	100	20			100		Cu, Pb, Zn
	53A				20	20			100		Cu, Pb
	54A				20	20	50		150		Cu, Pb, Sn
	55A				300	30			100		Cu, Pb
	56A	A-7-5028				10			20		
	57A			tr		20			40		Zn
	58A	A-6-5184				50			10		
	59A					100			10		V
	60A				-10	50			10		
	61A				-10	100			20		V
	62A				-10	70			20		
	63A				-10	100			10		V
	64A				-10	50			20		
	65A	A-5-5138		200	-10	20	10		10		Zn, Sn
	66A				-10	10			10		
	67A	A-5-5139			10	50	10		100		Pb, Sn
	68A				-10	50	10		50		Sn
	69A	A-6-5184	10		-10	150			20		V, Co
	70A		10		-10	100			20		V, Co
	71A	A-9-5124	10		-10	100			20		V, Co
	72A	A-10-5161			-10	10	10		70		Sn
	73A				-10	10			50		
	74A		10		-10	20			70		
	75A	A-11-5028	10		-10	50			20		Co
	76A				-10	10			50		
	77A				-10	10			20		
	78A				-10	10			50		

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average.
Limits of detection		1	1	200	1	5	10	1	10		
Average value		1	4	-	10	40	27	1	58		
CPDS 79A	A-11-5028					10			30		
80A			tr			10			30		Zn
81A						-10			20		
82A	A-11-5026			tr		10	30		70		Sn, Zn
83A						10			20		
84A						10			50		
85A						10			50		
86A				tr		10			50		Zn
87A						-10			100		Pb
88A	A-10-5165					10			100		Pb
89A	A-10-5164					10			70		
90A	A-10-5165					10			50		
91A						10			20		
92A						10			70		
93A						10			50		
94A	A-11-5023					10			70		
95A						-10			100		Pb
96A						10			50		
97A						10			50		
98A						10			50		
99A						-10			50		
100A						-10-10			20		
101A						-10-10			50		
102A						-10-10			50		
103A				tr		-10-10			50		Zn
104A						-10 10			20		
105A						10-10	100		70		Sn
106A						-10-10			50		
107A						-10-10	100		70		Sn
108A						-10 10			50		
109A						-10 10			70		
110A	A-10-5167					10 20			50		
111A						10 20			50		
112A						10-10			50		
113A						-10-10			100		Pb
114A	A-10-5169					-10-10	10		70		Sn
115A						-10 20			50		
116A						10 10			20		
117A						10 10	10	10	20		Sn, Mo
118A						10 10			20		

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
119A	A-10-5169				10	20			10		
120A					10	10			20		
121A					10	10			10		
122A	A-11A-5018				-10	-10			20		
123A		10		tr	-10	-10	30		50	Be	Zn, Sn, Be
124A					-10	10			20		
125A					-10	10	10		20		Sn
126A	A-11A-5020			tr	-10	20			20		Zn
127A					-10	20			20		
128A	A-13-5039				-10	10	10		50	Be	Sn, Be
129A					-10	10			20		
130A					-10	10			10		
131A					-10	20			50		
132A	A-9-5124				-10	20			30		
133A	A-10-5159				-10	10			20		
134A					-10	10			50		
135A					-10	-10			50		
136A					-10	10			20		
137A	A-11A-5026				-10	10	10		20		Sn
138A		10	10		10	50			10		Ni, Co
139A					-10	10			50		
140A			10		10	50			30		
141A	A-11A-5027				-10	10	20	10	20		Sn, Mo
142A					-10	-10			50		
143A		-10			-10	10			100		Pb
144A		10			10	20			150		Co, Pb
145A		10			10	20	20		150		Co, Sn, Pb
146A	A-11A-5029	10			-10	20	10		200		Co, Sn, Pb
147A		-10			-10	30			100		Pb
148A		-10			-10	30			100		Pb
149A		-10			-10	20			100		Pb
150A		-10			10	20			50		
151A		10			-10	20	10		100		Co, Sn, Pb
152A		10			10	10	20		50		Co, Sn
153A		-10			-10	20			70		
154A		-10			-10	20			70		
155A		-10			10	30	-10		100		Pb
156A	A-11-5032	-10	tr		-10	10			100		Zn, Pb
157A		-10			-10	50			70		
158A	A-8-5071	10	10		-10	30			50		Ni, Co

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
159A		10	10		-10	50			20		Ni, Co
160A	A-9-5124	10	20		-10	10			50		Ni, Co
161A		-10	-10	tr	-10	10			50		Zn
162A	A-11A-5027		-10		-10	10	-10		50		
163A			-10		-10	10			50		
164A			-10		-10	10			70		
165A	A-11A-5025				-10	-10			30		
166A				tr	-10	-10	20		70		Zn, Sn
167A					-10	10			50		
168A					-10	10	10		20		Sn
169A			10	tr	-10	10	200		70		Co, Zn, Sn
170A					-10	10			20		
171A					-10	10			50		
172A					-10	10			20		
173A			10		-10	50			50		Co
174A					-10	50			50		
175A					-10	10			50		
176A					-10	-10			100		Pb
177A					10	20	10		20		Sn
178A					-10	20			50		
179A					-10	10			50		
180A					-10	-10			50		
181A					-10	10			20		
182A					-10	-10			50		
183A					-10	10			50		
184A			10		-10	10			20	Be	Co, Be
185A					-10	10			20		
186A					-10	20			20		
187A	A-13-5046				-10	10			30		
188A	A-13-5040				-10	20			50		
189A					-10	10			30		
190A					-10	10	10		50		Sn
191A					-10	20			50		
192A					-10	10			30		
193A					-10	10	10		100		Sn, Pb
194A					-10	-10	-10		100		Pb
195A					-10	10	-10	30	70	Be	Mo, Be
196A					-10	10	10		70	Be	Sn, Be
197A	A-8-5071				-10	50	-10		50		
198A	E-3-5099				-10	10	-10		100		Pb
199A					Not analysed						
200A	A-8-5071				tr	-10	-10	150	70		Zn, Sn

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	40		
Average Value		1	4	-	10	40	27	1	58		
201A	A-8-5071				-10	-10			100		Pb
202A	A-8-5070				-10	-10			100		Pb (no locality)
203A	A-8-5068				-10	10	-10		70		
204A					-10	10			50		
205A					-10	-10			50		
206 A					-10	-10			50		
207A					-10	-10			70	Be	Be
208A					-10	-10			50	Be	Be
209A					-10	10	20		50		Sn
210A	A-9-5127				-10	-10	10		100		Sn, Pb
211A					-10	-10	10		50		Sn
212A					-10	-10	10		50		Sn
213A					-10	-10	10		70		Sn
214A					-10	10	20		100		Sn, Pb
215 A					-10	10			30		
216A					-10	-10			50	Be	Be
217A					-10	20	10		50		Sn
218A					-10	20	50		50		Sn
219 A					-10	10	20		70		Sn
220A					-10	-10	30		100	Be	Sn, Pb, Be
221A					-10	-10	50		50	Be	Sn, Be
222 A					-10	10	50		50		Sn
223 A	A-10-5156				-10	10	50		50		Sn
224A					-10	10			30		
225A					-10	10			50		
226A					10	50			50		
227A		-10			10	20	-10		100		Pb
228A					-10	-10			50	Be	Be
229A					-10	10			50		
230A	A-10-5159				-10	-10			50		No locality
231A	A-11-5032				-10	10			100		Pb
232A					-10	10			100		Pb
233A					-10	10			70		
234A					-10	10			50		
235 A					-10	10			100		Pb
236 A	A-11-5039				-10	10	20		100		Sn, Pb
237 A					-10	10			20	Be	Be
238 A					-10	-10			50		
239A					-10	-10			50		
240A					-10	10	10		100		Sn, Pb
241 A	A-11-5032				-10	-10			100		Pb

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
242A	A-11-5032				-10	10			50		
243A	A-10-5156				-10	10			100		Pb
244 A			-10		10	20			20		
245 A					-10	-10			50		
246 A					-10	-10			50		
247A					-10	10			70		
248A					-10	-10			70		
249A					-10	-10			20		
250A						-10			20		
251A					-10	-10			50	Be	Be
252A					-10	-10			100		Pb
253A					-10	-10			100		Pb
254A					-10	-10			50		
255A						10	20		70		Sn
256 A	A-10-5154					-10			100	Be	Pb, Be
257 A					-10	-10			100	Be	Pb, Be
258A					-10	20			70		
259A					-10	20			100		Pb
260 A					-10	50			50		
261A					-10	20	50		100		Sn Pb
262 A						20			100		Pb
263 A	A-6-5186				-10	20			50		
264 A					-10	20			50		
265 A						20			100		Pb
266 A						20			30		
267 A						20			50		
268 A						20			70		
269A	A-6-5188				20	20			400		Pb, Cu
270A						50			100		Pb
271A					10	50	-10		70		
272A			10		20	50			50		Co, Cu
273 A					10	50			20		
274 A					-10	20			20		
275 A					-10	20	50		50		Sn
276 A	A-7-5034				-10	-10	100		50	Be	Be, Sn
277 A					-10	-10	500		50	Be	Sn, Be
278 A			10		-10	50	10		10	Be	Co, Sn, Be
279 A							300		20	Be	Sn, Be
280 A					10	10	20		20		Sn

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements & higher than average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
281A	A-7-5034				-10	20	750		20		Sn
282A					-10	20	300		50		Sn
283A						10	500		20		Sn
284A	A-7-5036				-10	20	10		20	Be	Sn, Be
285A					-10	10	30		50	Be	Sn, Be
286A	A-8-5063				-10	20			-10		
287A			10		10	70	10		10		Co, Sn
288A			10		10	100	50		10		Co, V, Sn
289A	A-6-5190		-10		-10	70	150		20		Sn
290A			-10		10	70			20		
291A	A-6-5188		-10		-10	50			30		
292A			-10		10	100			50		V
293A	A-10-5169				20	-10	100	20	50		Cu, Sn, Mo
294A					10	10	30	20	50		Sn, Mo
295A					10	50		-10	-10		Mo
296A					20	50			10		Cu
297A					-10	10			50		
298A					-10	30			10		
299A	A-10-5167				-10	50	-10		20		
300A					-10	50	-10		10		
301A					-10	10			20		
302A					-10	20			20		
303A					-10	10			10		
304A					-10	-10			50		
305A					-10	10		-10	50		Mo
306A	A-10-5165				-10	10	-10	-10	70		Mo
307A					-10	-10			50		
308A					-10	-10			50		
309A					-10	-10	10		20		Sn
310A	A-9-5119		-10		10	10	300		50		Sn
311A					-10	-10		-10	70		Mo
312A					-10	-10		-10	50		Mo
313A					10	-10		10	50		Mo
314A					-10	-10			20		
315A	A-10-5165				-10	10			70		
316A	A-9-5119				-10	10			20		
317A	A-10-5165				-10	10	50		20		Sn
318A	A-10-5170				-10	-10	400		10		Sn
319A					-10	10	300		20		Sn
320A					-10	-10	20		50		Sn
321A					-10	-10	30		50		Sn

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
322A	A-10-5110				-10	-10	10		50		Sn
323A					-10	10	70		100		Sn Pb
324A					50	10	500		50		Cu, Sn
325A						-10	20		10		Sn
326A			-10		-10	10	20		20		Sn
327A			-10		20	10	200		100		Cu, Sn, Pb
328A	A-9-5115		-10		-10	10	50		100		Sn, Pb
329A					-10	-10	500		100	Be	Sn, Pb, Be
330A					-10	-10	500		70		Sn
331A			10		30	50	1000		150		Co, Cu, Sn, Pb
332A			-10		-10	10	20		100		Sn, Pb
333A			-10		-10	10	500		70		Sn
334A			10		-10	200	10		50		Co, V, Sn
335A			10		-10	100	20		10		Co, V, Sn
336A					30	100	2000		500		Cu, V, Sn, Pb
337A			10		-10	100	200		10		Co, V, Sn
338A	A-10-5172		-10		10	10	10		10		Sn
339A			-10		-10	10	20		10		Sn
340A			-10		-10	10	-10		10		
341A					-10	10	10		50		Sn
342A					-10	10	10		50		Sn
343A					10	10	-10		20		
344A					-10	10	-10		50		
345A					10	10	20		50		Sn
500A	E-1-5052	-10			-10	50			10		
501A	E-1-5053				-10	10	10		50		Sn
502A					-10	20	20		50		Sn
503A					-10	10	10		50		Sn
504A					-10	10	10		50		Sn
505A					-10	10	20		30		Sn
506A					-10	10	20		20		Sn
507A					-10	10			20		
508A					-10	10	10		20		Sn
509A					-10	10			20		
510A					-10	10	10		20		Sn
511A					-10	10			10		
512A					-10	20	200		30		Sn

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
513A	E-1-5053				10	20			20		
514A					-10	50			50		
515A					-10	20	10		50		Sn
516A					-10	50			50		
517A	E-2-5087	10	20		20	100			10		Co, Ni, Cu, V
518A		10	20		10	100			20		Co, Ni, V.
519A					-10	20	20		10		Sn
520A	E-2-5087		10		-10	50			20		Co
521A					-10	10			20		
522A			10		10	50	400		20		Co, Sn
523A			10		20	50	100		30		Co, Cu, Sn
524A			10		10	50	50		20		Co, Sn
525A			-10		10	50	100		50		Sn
526A			-10		-10	10			10		
527A					-10	20	20		10		Sn
528A					-10	10			10		
529A					-10	20					
530A					-10	20	150		10		Sn
531A			20		10	50	50		10		Co, Sn
532A			20		-10	70			10		Co
533A					-10	10			10		
534A			10		20	100			10		Co, Cu, V
535A	E-2-5085		10		10	100		10	70		Co, V, Mo
536			10		20	100			10		Co, Cu, V
537		10			10	100			10		Ni, V
538					20	100			20		Cu, V
539			10		10	100			10		Co, V
540A	Not sampled										
541A					10	100			20		
542A			10		20	150			20		Co, Cu, V
543A			10		20	150			10		Co, Cu, V
544A			10		10	150			10		Co, V
545A		-10	20		20	150			20		Co, Cu, V
546A		-10	10		20	150			10		Co, Cu, V
547A		10	20		20	200			10		Ni, Co, Cu, V
548A		-10	10		20	100			10		Co, Cu, V
549A	E-2-5089	20	10		10	150			-10		Ni, Co, V
550A		20	20		10	150	10		10		Ni, Co, V, Sn
551A		100	30	200	20	50			10		Ni, Co, Zn, Cu.
552A		10	10		-10	100			10		Ni, Co, V

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
553A	E-2-5089	20	10	tr	-10	200			-10		Ni,Co,Zn,V
554A		10	10		-10	70			-10		Ni,Co.
555A					-10	100			10		
556A		10	10		-10	70			10		Ni, Co.
557A		50	50		20	200			10		Ni,Co,Cu,V
558A		50	30	tr	-10	150		10	10		Ni,Co,Zn,V,Mo
559A		30	30		10	100			10		Ni,Co,V
560A	No locality	20	20		-10	100			20		Ni,CO, V
561A	E-3-5101	30	30		-10	100			-10		Ni,Co,V
562A	no locality	20	10		10	150			50		Ni,Co,V
563A		-10	10		-10	50			10		Co
564A			-10			50			10		
565A		30	20		10	70			10		Ni,Co.
566A			10		-10	70			20		Co
567A		10	10		-10	100			20		Ni,Co,V
568A		20	20		10	50			10		Ni,Co,
569A		10	20		-10	100			20		Ni,Co,V
570A		10	20		-10	150			10		Ni,Co,V
571A	E-4-5177	30	50		-10	100			10		Ni,Co,V
572A		20	30		-10	100	150		10		Ni,Co,V,Sn
573A		10	-10		-10	20			-10		Ni
574A		20	20		-10	150	10	10	-10		Ni,Co,V,Sn,Mo
575A		20	30		10	200			10		Ni,Co,V
576A		30	20		-10	70			10		Ni,Co
577A		-10	10		-10	50	10		20		Co,Sn
578A		20	10		-10	100			10		Ni,Co,V
579A		20	10		10	100	10		10		Ni,Co,V,Sn
580A			-10		-10	300			10		V
581A			10		-10	100			20		Co,V
582A			10		-10	200			50		Co,V
583A					-10	100			70		V
584A			10		-10	100			50		Co,V
585A			-10		-10	300	10		10		V,Sn
586A			-10		-10	70			20		
587A			-10		-10	70			20		Co
588A			10		-10	100	100		10		Co,V,Sn
589A					-10	20	100		10		Sn
590A			-10		-10	50	30		50		Sn
591A			-10		-10	300			50		V
592A			10		-10	100			10		Co,V

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements Higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
593A	E-4-5177		-10		-10	100			20		V
594A			-10		-10	150			50		V
595A			10		-10	200			10		Co,V
596A			-10		-10	100			50		V
597A			-10		-10	50			70		
598A			-10		-10	70			150		Pb
599A			-10		-10	400	300	10	400		V,Sn,Mo,Pb
600A	No locality		-10		-10	50			-10		
601A			10			70	30		100		Co,Sn,Pb
602A			10		-10	100			50		Co,V
603A	E-3-5101	20	20		-10	70			-10		Ni,Co.
604A		20	20		10	150	70		-10		Ni,Co,V,Sn
605A		10	20		-10	20			-10		Ni,Co
606A		10	20		-10	150			10	Be	Ni,Co,V,Be
607A		10	10	tr	10	70	10		30		Ni,Co,Zn,Sn
608A	E-4-5179	-10	10		-10	100			10		Co,V
609A		10	10		-10	100			10		Ni,Co,V
610A		10	20		-10	150			-10		Ni,Co,V
611A		20	20		-10	150			10		Ni,Co,V
612A		-10	10		-10	200			-10		Co,V
613A		-10	10		-10	300			10		Co,V
614A			-10		-10	50			20		
615A			10		-10	300			20	Be	Co,V,Be
616A			-10		-10	150			20		V
617A			-10		-10	50			10		
618A					-10	100			50		V
619A			-10		-10	150			10		V
620A			-10		-10	300			10		V
621A			20		-10	100			10		Co,V
622A			-10		-10	100			10		V
623A			10		-10	150			20		Co,V
624A		-10	-10		-10	200			50		V
625A			-10		-10	100			10		V
626A			-10		-10	150			10		V
627A			-10		-10	200			20	Be	V,Be
628A			-10		-10	200			20		V
629A					-10	100			-10		V
630A			10		-10	300			10		Co,V
631A			-10		-10	100			10		V
632A			-10		-10	300			20		V
633A			-10		-10	150			10		V

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
634A	E-2-5089		-10		-10	20			-10		
635A		20	30		20	100			20		Ni,Co,Cu,V
636A	E-1-5049	10	10		-10	50			20		Ni,Co
637A		50	30		-10	70			10		Ni,Co.
638A					-10	20			20		
639A	E-1-5047				-10	10			20		
640A		10	10		-10	70			30		Ni,Co,
641A					-10	50		10	50		Mo
642A					-10	50		-10	10		Mo
643A					-10	20		-10	20		Mo
644A					10	20		10	50		Mo
645A			10		-10	30		-10	30		Co,Mo
646A		10	10		-10	50		-10	20		Co,Ni,Mo
647A		-10	-10		-10	20			20		
648A					-10	10		20	20		Mo
649A					-10	20		20	20		Mo
650A		-10	20		-10	10			50		Co
651A					10	20		-10	70		Mo
652A					-10	10			50		
653A		10	20		10	70		10	20		Ni,Co,Mo
654A					10	50		20	70		Mo
655A					-10	-10			50		
656A					-10	50		10	50		Mo
657A	E-2-5091		10		-10	100		10	70		Co,V,Mo
658A					-10	20			100		Pb
659A					-10	50			150		Pb
660A		-10			-10	50		-10	70		Mo
661A		10			-10	50		10	70		Co,Mo
662A		10			-10	70		10	100		Co,Mo,Pb
663A		10			-10	10		10	50	Be	Co,Mo,Be
664A					-10	10			70	Be	Be
665A					-10	-10		-10	70	Be	Mo,Be
666A					-10	10			50		
667A		-10			-10	50			70		
668A	E-4-5175				-10	10	-10		20		
669A			30		-10	20	20		20		Co,Sn
670A					-10	-10	50		50	Be	Sn,Be
671A					-10	10	20		50		Sn
672A	E-5-5193					-10	20		50		
673A		10			-10	-10	20		20		Co

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
674A	E-5-5193				-10	30			20		
675A			10		-10	100			10	Be	Co, V, Be
676A			10		-10	100			20	Be	Co, V, Be
677A			10		-10	150			20	Be	Co, V, Be
678A			10		-10	100			10		Co, V
679A			-10		-10	70			20		
680A			-10		-10	150			10		V
681A			10		-10	50			10		Co
682A			10		-10	50			10		Co
683A			10		-10	50	10		20		Co, Sn
684A	E-4-5175		10		10	400	20	10	50		Co, V, Sn, Mo
685A			-10		-10	10			10		
686A		10	10		-10	20			10		Ni, Co
687A			-10		-10	100			20	Be	V, Be
688A					-10	10	10	10	70		Sn, Mo
689A	E-3-5099	10	20		-10	100			-10		Ni, Co, V
690A		10	30		-10	100			-10		Ni, Co, V
691A		20	30		-10	100			-10		Ni, Co, V
692A		10	20		-10	100			20		Ni, Co, V
693A		10	20		-10	100			20		Ni, Co, V
694A		-10	10	100	-10	150	10		10		Zn, Sn
695A					-10	10			20		
696A					-10	10			20		
697A					-10	20			50		
698A					-10	-10			50		
699A					-10	10			50		
700A					-10	20			50		
701A	E-4-5175	-10			-10	100			10		V
702A		10			-10	100			20		Co, V
703A		-10			-10	50			20		
704A		-10			-10	200			10	Be	V, Be
705A		-10			-10	100			10		V
706A		-10			-10	200			10		V
707A		-10			-10	50			20		
708A	A-13-5027	10			20	10			20		Co, Cu
709A		-10				-10			10		
710A	A-15-5009	10			20	20			20		Co, Cu
711A	E-1-5051	10			-10	20			20		Co
712A		-10	-10		-10	10	20		10		Sn
713A		-10	20		-10	10			-10		Co
714A		-10	10		-10	20			10		Co

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
715A	E-2-5088	-10	-10		10	20			20		
716A		-10	-10		20	50	200		20		Cu, Sn
717A		-10	10		20	50	100		20		Co, Cu, Sn
718A		-10			-10	10	100		10	Be	Sn, Be
719A	E-3-5097	-10	-10		-10	50			20		
720A		-10	10		-10	20			20		Co
721A					-10	10			50		
722A					-10	10			50	Be	Be
723A					-10	20			70		
724A					-10	10			20		
725A					-10				20		
726A					-10				20	Be	Be
727A					-10				50		
728A		10	20		-10	20			-10		Co, Ni
729A		10	20		10	50			10		Co, Ni
730A			-10		-10	10			50		
731A					-10	10			100	Be	Pn, Be
732A			-10		-10	10			50	Be	Be
733A					-10	-10			70	Be	Be
734A					-10	-10			70	Be	Be
735A					-10	-10			10	Be	Be
736A	E-2-5085	-10	10		10	100			10		Co, V
737A			-10		-10	70	10		10		Sn, V
738A			-10		-10	20			20		
739A		-10	10		10	70			50		Co
740A		-10	10		10	100			20		Co, V
741A		-10	10		10	50			10		Co
742A		10	20		10	100			10		Ni, Co, V
743A		10	10		10	100			20		Ni, Co, V
744A		-10	10		10	100			10		Co, V
745A		-10	10		10	100			10		Co, V
746A			10		20	150			10		Co, Cu, V
747A			10		-10	150			10		Co, V
748A			10		-10	50			20		Co
749A			-10		10	50			100		Pb
750A					-10	20		10	50		Mo
751A	E-3-5101	-10	10		-10	100			20		Co, V
752A		-10	10		-10	100			20		Co, V
753A		10	10		-10	50			10		Ni, Co
754A	E-3-5103				-10	-10			20		
755A			-10		-10	50			20		

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average.	
Limits of detection		1	1	200	1	5	10	1	10			
Average Value		1	4	-	10	40	27	1	58			
756A	E-3-5103	-10	-10		-10	50			10			
757A		-10	-10		-10	70			20			
758A	A-14-5193				-10	-10	-10	-10	100		Mo, Pb	
759A					-10	-10			20			
760A					-10	-10			50			
761A					-10	-10		10	20		Mo	
762A	2m - 402 map		70		-10	100		10	10		Co, V, Mo	
763A			-10		10	50			30			
764A					-10	50			20			
765A					-10	20			20			
766A			-10		-10	300			10	Be	V, Be	
767A					-10	20			20			
768A	E-4-5181				-10	20			20			
769A					-10	20		-10	20		Mo	
770A					-10	50			50			
771A	not analysed											
772A	E-2-5092				-10	20		20	70		Mo	
773A					50	-10	10		100	Be	Cu, Sn, Pb, Be	
774A					10	-10	-10		10	50	Be	Mo, Be
775A					-10	-10		10	70		Mo	
776A			10		20	50			100		Co, Cu, Pb	
777A					-10	-10	10	-10	100		Sn, Mo, Pb	
778A					-10	10			100		Pb	
779A			-10		-10	10			100		Pb	
780A					10	-10	10		70		Sn	
781A					-10	-10		10	100		Mo, Pb	
782A					-10	10			20			
783A					-10	-10			10			
784A	2m - 402 map		-10		10	70		-10	20		Mo	
785A					-10	50		-10	20		Mo	
786A					-10	100		-10	20		V, Mo	
787A					10	100		-10	50		V, Mo	
788A			-10		10	200			20	Be	V, Be	
789A					10	50	-10		20			
790A					-10	20			50			
791					-10	-10			50			
792					-10	-10			50	Be	Be	
793					10	-10	-10		20			
794					-10	-10			20			
795A	E-5-5192		-10		-10	70			20			
796A			10		10	70			50		Co	

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements & higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
797A	E-5-5192		-10		-10	200			70		V
798A			10		20	200			50		Co, Cu, V
799A			10		20	100			70		Co, Cu, V
800A			-10		-10	100			70		V
801A			-10		-10	150			50		V
802A			-10		10	100		-10	400		V, Mo, Pb
803A					10	100		10	200		V, Mo, Pb
804A	E-4-5176		10		-10	100			200		Co, V, Pb
805A			-10		-10	150			100		V, Pb
806A			-10		10	100	20		100		V, Sn, Pb
807A			-10		-10	100	20		50		V, Sn
808A			-10		-10	70	20		50		Sn, (No locality)
809A			-10		-10	200			200		V, Pb
810A	E-4-5177		-10		-10	50	20		70		Sn
811A			-10		-10	200		-10	150		V, Mo, Pb
812A			-10		10	50		-10	300		Mo, Pb
813A	E-5-5190		20		-10	100			10		Co, V
814A			-10		-10	70			10		
815A					-10	10			10		
816A			10		-10	70			70		Co
817A			20		-10	100			10		Co, V
818A			10		-10	100			10		Co, V
819A		-10	20		-10	100			10		Co, V
820A	E-4-5178		-10		-10	100			50		V
821A					-10	50			50		
822A	E-4-5178		-10		-10	70			50		
823A			-10		-10	50			70		
824A					-10	20			30		
825A					10	100		10	100		V, Mo, Pb
826A					-10	100			50		V
827A					-10	10			50		No locality
1000A	A-2-5097				10	20			10		
1001A	A-2-5097		-10		10	20			20		
1002A				700	50	20			20		Zn, Cu
1003A					-10	70			20		
1004A					10	50			50		
1005A					20	50	10		70		Cu, Sn
1006A	A-1-5039		10	1000	1000	50	150		500		Co, Zn, Cu, Sn Pb
1007A			10	700	700	20	100		200		Co, Zn, Cu, Sn, Pb

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1008A	A-1-5039			tr	20	20	10		150		Zn,Cu,Sn,Pb
1009A				tr	30	50	20		200		Zn,Cu,Sn,Pb
1010A					30	50	10		200		Cu,Sn,Pb.
1011A	No Sample										
1012A					-10	-10	10		50		Sn
1013A		-10	tr		10	50	20		50		Zn,Sn,
1014A		-10			20	50	10		100		Cu,Sn,Pb
1015A		-10			30	50	10		100		Cu,Sn,Pb
1016A		-10			30	50	20		200		Cu,Sn,Pb
1017A		-10			20	50	-10		100		Cu,Pb
1018A		-10			-10	50	10		50		Sn
1019A					20	70	10		50		Cu, Sn
1020A					20	50	10		100		Cu,Sn,Pb
1021A		-10			20	70	10		70		Cu,Sn
1022A					20	100	-10		100		Cu,V,Pb
1023A					10	70	-10		100		Pb
1024A	A-8-5072				-10	10	-10		150		Pb
1025A					-10	20	200		50		Sn
1026A					-10	20	150		70		Sn
1027A					-10	20	150		50		Sn
1028A					10	20	200		100		Sn,Pb
1029A					-10	100	-10		70		V
1030A					-10	30	500		30		Sn
1031A					-10	20	500		100		Sn,Pb
1032A					-10	20	70		100		Sn,Pb
1033A					-10	10	100		20	Be	Sn,Be
1034A					-10	10	150		50		Sn
1035A					-10	10			20		
1036A					-10	10			70		
1037A					-10	30	-10		50		
1038A					-10	10	300		70		Sn
1039A	A-9-5121				-10	10			100		Pb
1040A					-10	-10			100		Pb
1041A					-10	10			50		
1042A	A-9-5121		-10		30	20	300		100		Cu,Sn,Pb
1043A					10	10	100		70		Sn
1044A	A-8-5075				-10	10	300		150		Sn,Pb
1045A					-10	-10	10		100		Sn,Pb
1046A		-10			10	50	100		100		Sn,Pb
1047A		-10			30	50	30		50		Cu,Sn
1048A		-10			50	50	50		50		Cu,Sn

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average.
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1049A	A-8-5072				10	20	20		70	Be	Sn, Be
1050A	A-9-5117		10	700	400	50	2000		300		Co, Zn, Cu, Sn
1051A					10	50	1000		200		Sn, Pb
1052A			10		50	20	500		150		Co, Cu, Sn, Pb
1053A	A-8-5079				-10	20	500		200		Sn, Pb
1054A					-10	-10	100		100	Be	Sn, Pb, Be
1055A					-10	-10	500		100		Sn, Pb
1056A	A-7-5027		-10		10	50			200		Pb
1057A			-10		-10	70			50		
1058A			-10		-10	50			50		
1059A			-10		-10	50			50		
1060A					-10	20	100		70		Sn
1061A					10	50	200		100		Sn, Pb
1062A					-10	30	400		100		Sn, Pb
1063A			-10		20	50	1000		200		Cu, Sn, Pb
1064A					-10	50	10		50		Sn
1065A					-10	50	20		20		Sn
1066A					-10	20			20		
1067A			-10		-10	200			20		V
1068A	A-6-5184		-10		-10	200			20		V
1069A	A-5-5139		-10		-10	100	70		50		V, Sn
1070A			-10		-10	200			50		V
1071A					-10	100			100		V, Pb
1072A					-10	100	10		100		V, Sn, Pb
1073A	A-4-5173		-10		-10	150	20		100		V, Sn, Pb
1074A			20		-10	700	50		30		Co, V, Sn
1075A			-10		-10	70			20		
1076A			-10		-10	100			30		V
1077A			20		-10	500			10		Co, V
1078A			-10		-10	150	50		100		V, Sn, Pb.
1079A			-10		-10	150			70		V
1080A			-10		-10	100			70		V
1081A			-10		-10	100			100		V, Pb
1082A			-10		-10	200			20		V
1083A			10		-10	300			20		Co, V
1084A	A-3-5125		-10		-10	300			20		V
1085A			-10		-10	100	10		70		V, Sn,
1086A			-10		20	100	20		50		Cu, V, Sn,
1087A			-10		10	50			20		
1088A			10		-10	70			50		Co
1089A			-10		20	70			150		Cu, Pb

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1090A	A-8-5068					10			70		
1091A						10			100		Pb
1092A						10			50		
1093A						-10			50		
1094A						-10	20		70		Sn
1095A							100		50		Sn
1096A						-10	50		100		Sn, Pb
1097A						-10	10		50		Sn
1098A						-10			30		
1099A						-10	50		50		Sn
1100A							10		100	Be	Sn, Pb, Be
1101A						-10	10		50		Sn
1102A						-10			150		Pb
1103A						-10			150		Pb
1104A						-10	10		100		Sn, Pb
1105A					10	100	20		150		V, Sn, Pb
1106A					-10	20	20		100		Sn, Pb
1107A					-10	20	100		100		Sn, Pb
1108A					-10	10			150		Sn, Pb
1109A					10	50	300		150		Sn, Pb
1110A					-10	100	10		50		V, Sn
1111A	A-10-5157				-10	50			20		
1112A						10	10		70		Sn
1113A						-10			50	Be	Be
1114A						-10			50	Be	Be
1115A	A-11-5032					20			100		Pb
1116A						20	10		170		Sn
1117A	A-10-5160					30			50		
1118A						20			50		
1119A						10			70		
1120A					-10	20		10	100		Mo, Pb
1121A						20	10		50		Sn
1122A						20			70		
1123A					-10	10	-10		50		
1124A	A-11-5029				-10	-10		-10	10		Mo
1125A					-10	10	50		50		Sn
1126A					-10	20	10		20		Sn
1127A					-10	20			20		
1128A	Not tested										
1129A	E-2-5087	-10	10		-10	70			50		Co
1130A	E-1-5045				-10	10	-10	10	70		Mo (no locality)

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1131A	E-4-5181				10	20	20	-10	150		Sn, Mo, Pb
1132A					-10	20	10		100		Sn, Pb
1133A					10	50	10		200		Sn, Pb
1134A					50	50	10	10	200		Cu, Sn, Pb, Mo
1135A					-10	50			200		Pb
1136A					10	10		10	200		Mo, Pb
1137A					10	10		10	150		Mo, Pb
1138A				200	20	50	20	20	300		Zn, Cu, Sn, Mo, Pb.
1139A	E-4-5179	-10	10	30	200			-10	150	Be	Ni, Co, Cu, V, Mo, Pb, Be.
1140A	E-4-5181	20	20		10	100			100		Ni, Co, V, Pb.
1141A		10			20	150			200	Ag/Be	Co, Cu, V, Pb, Be, Ag.
1142A	Sample consumed in wet analysis - averaged 250 ppm Zn										
1143A	Sample consumed in wet analysis - averaged 125 ppm Zn										
1144A	E-5-5189	20	30		20	200			150		Ni, Co, Cu, V, Pb
1145A					-10	150			20		V
1146A		10			-10	150	10		50		Co, V, Sn
1147A		10			-10	100	20		10		Co, V, Sn
1148A	E-5-5191	10			-10	70			10		Co, (no locality)
1149A	E-6-5007	10			-10	100			20		Co, V
1150A		-10			-10	100			20		V
1151A	E-5-5195				-10	20			70		
1152A	E-5-5197	-10			-10	30			10		
1153A	A-14-5189				-10	10			10		
1154A					10	20			20		
1155A		-10			-10	100			10		V
1156A					10	20			10		
1157A					10	20			10		
1158A					10	50			10		
1159A					-10	20			10		
1160A	A-14-5191				-10	10		10	10	Ag	Mo, Ag
1161A					-10	10		10	10		Mo.
1162A	A-14-5189				30	50		-10	20		Cu, Mo.
1163A		10			-10	150			10		Co, V.
1164A		10			-10	50			10		Co
1165A					-10	20			30		
1166A	A-15-5007	-10			-10	70	10		20		Sn
1167A					-10	20			10		
1168A					-10	10			20		
1169A					-10	10			10		

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1170A	A-15-5007				-10	10			10		
1171A	E-1-5049				-10	50			10		
1172A					-10	10			70		
1173A	E-1-5047				-10	10			30		
1174A					-10	10			50		
1175A	A-14-5191		10		10	50			30		Co
1176A			-10		10	10	10		-10		Sn
1177A					-10	10			10		
1178A					-10	10			20		
1179A					-10	-10	100		50		Sn
1180A					-10	-10			50		
1181A					-10	-10	20		20		Sn
1182A					-10	-10			20		
1183A					-10	-10	10		50		Sn
1184A					-10	-10	50		50		Sn
1185A					-10	-10			50		
1186A					-10	-10			50		
1187A	A-14-5193				10	-10	10		100		Sn, Pb
1188A					-10	-10			20		
1189A					-10	-10			20		
1190A					-10	-10			20		
1191A					-10	10			70		
1192A					-10	-10			20		
1193A					-10	-10			200		Pb
1194A						-10			100		Pb
1195A						-10		10	20		Mo
1196A						-10			20		
1197A	A-15-5007					-10			50		
1198A			-10		10	20			10		
1199A					-10	20			50		
1200A					-10	30			50		
1201A	A-15-5005				-10	10			50		
1202A			-10		-10	70			100		Pb
1203A					-10	20			150		Pb
1204A			-10		10	30			20		
1205A			10		10	50			-10		Co
1206A			-10		-10	20			50		
1207A			-10		-10	50			50		
1208A	E-4-51		10		-10	50			50		Co
1209A			-10			300			20	Be	V, Be

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be & others	Elements higher than average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1210A	E-4-5179	-10	20		20	150			50		Ni, Co, Cu, V
1211A		-10	10		-10	50			10		Ni, Co.
1212A	E-5189	-10	20		20	200			150		Ni, Co, Cu, V, Pb
1213A						10			-10		
1214A					-10	10			50		
1215A						10			50		
1216A						20			20		
1217A											
1218A						20			20		
1219A						10			100		Pb
1220B [*]						10			10		
1221A	E-5-5191		-10		-10	200			200		V, Pb
1222A			-10		-10	200			100		V, Pb
1223A			-10		-10	300			150		V, Pb
1224A			10		10	200			150		Co, V, Pb
1225A			10		10	150			150		Co, V, Pb
1226A			-10		10	100			200		V, Pb
1227A			-10		-10	200			150		V, Pb
1228A					-10	70			10		
1229A			-10		-10	20			10		
1230A		-10	20		-10	100			10		Co, V
1231A		-10	10		-10	100			10		Co, V
1232A	E-5-5189		-10			100			20		V
1233A			-10			200	50		10		V, Sn
1234A			-10		-10	150			10		V
1235A		-10	10		-10	150	10		30		Co, V, Sn
1236A			20		-10	70			10		Co
1237A					-10	150			50		V
1400A	E-4-5181				20	20	20	10	200		Cu, Sn, Mo, Pb
B				tr	30	10	10	10	200	Be	Zn, Cu, Sn, Mo, Pb, Be
1401A			-10		10	100			150		V, Pb
1402A					-10	20			100		Pb
1403A					-10	200			70		V
1403B					-10	70			50		
1404A					-10	200			50		V
B					-10	70			50		

^{*} "B" samples are bank samples.

Sample No.	Photo Code	Ni	Co	Zn	Cu	V	Sn	Mo	Pb	Be	Elements & higher than others average
Limits of detection		1	1	200	1	5	10	1	10		
Average Value		1	4	-	10	40	27	1	58		
1405A					10	100			150		V, Pb
1406A					10	70			70		
1407A				tr	20	200	20	-10	500		Zn, Cu, V, Sn, Mo, Pb.
B				tr	10	150	10	-10	400		An, V, Sn, Mo, Pb
1408A			-10	tr	20	100	10	10	400		Zn, Cu, V, Sn, Mo, Pb.
B				300	20	100	10	10	300		Zn, Cu, V, Sn, Mo, Pb.
1500A	E-4-5180				20	20	-10	10	200		Cu, Mo, Pb
B					20	50	-10	10	200		Cu, Mo, Pb
1501A					-10	50		10	20		Mo
1502A			-10		10	50		10	150		Mo, Pb
2B					10	70		-10	200		Mo, Pb
1503A			-10		10	70	-10	-10	150		Mo, Pb
1504A			10		-10	20			20		Co
1505A				200	30	100	20	20	500		Zn, Cu, V, Sn, Mo, Pb.
B				200	30	100	20	20	400		Cu, V, Sn, Mo, Pb, Zn.
1506A				200	50	200	20	10	200		Zn, Cu, V, Sn, Mo, Pb.
1507A				tr	30	100	10	10	70		Zn, Cu, V, Sn, Mo.
1508A				tr	30	50	0	10	200		Zn, Cu, Sn, Mo, Pb.
B				200	50	100	50	20	300		Zn, Cu, V, Sn, Mo, Pb.
1509A			10	200	50	100	10	10	150		Co, Zn, Cu, V, Sn, Mo.
B			10	300	50	100	20	-10	200		Co, Zn, Cu, V, Sn, Mo.

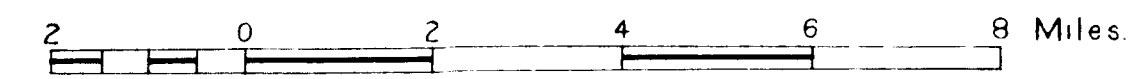
CHILLAGOE-MT GARNET AREA

NORTH QUEENSLAND

GEOCHEMICAL SAMPLING LOCALITIES

BMR REGIONAL GEOCHEMICAL PROGRAMME 1961

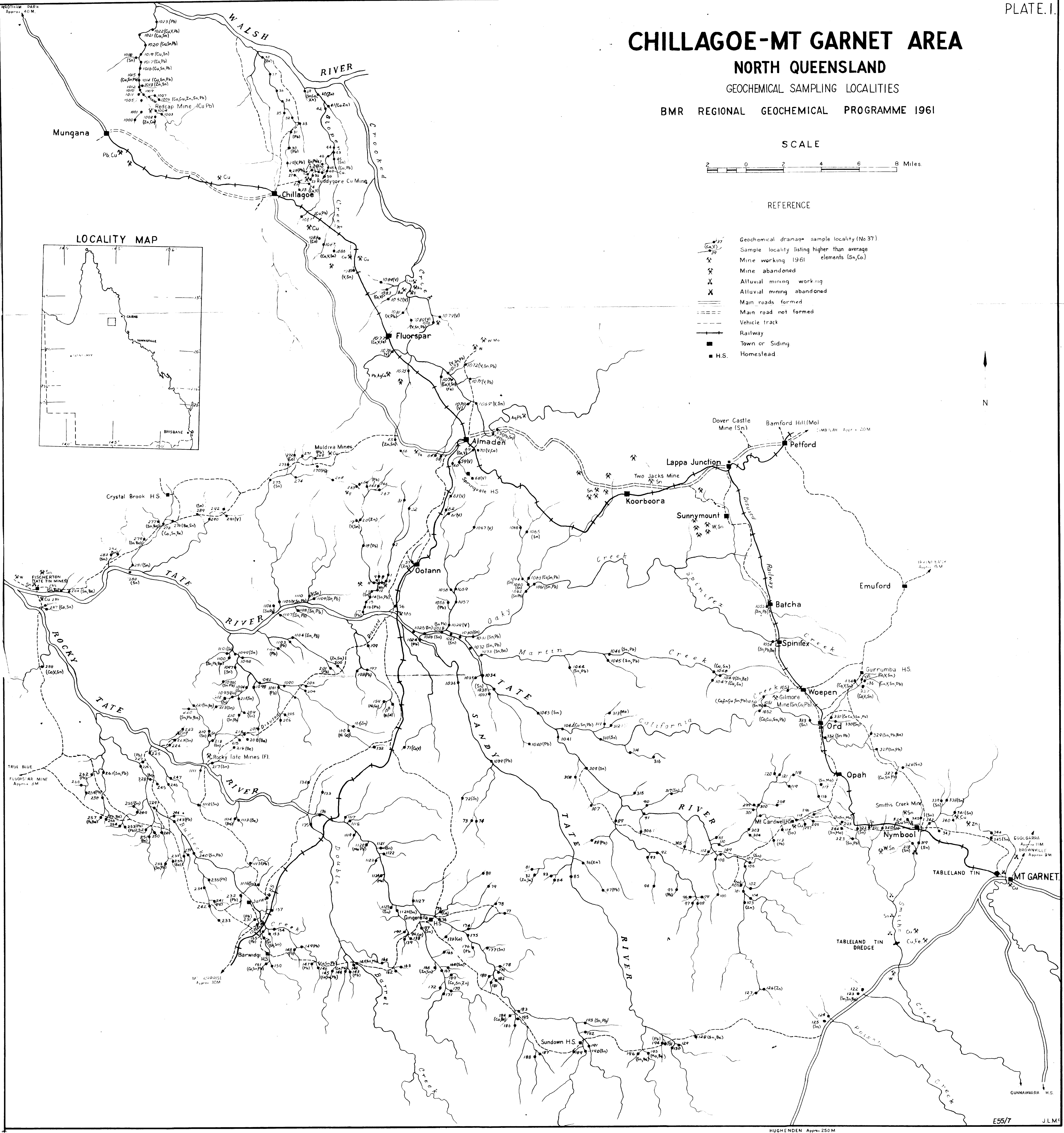
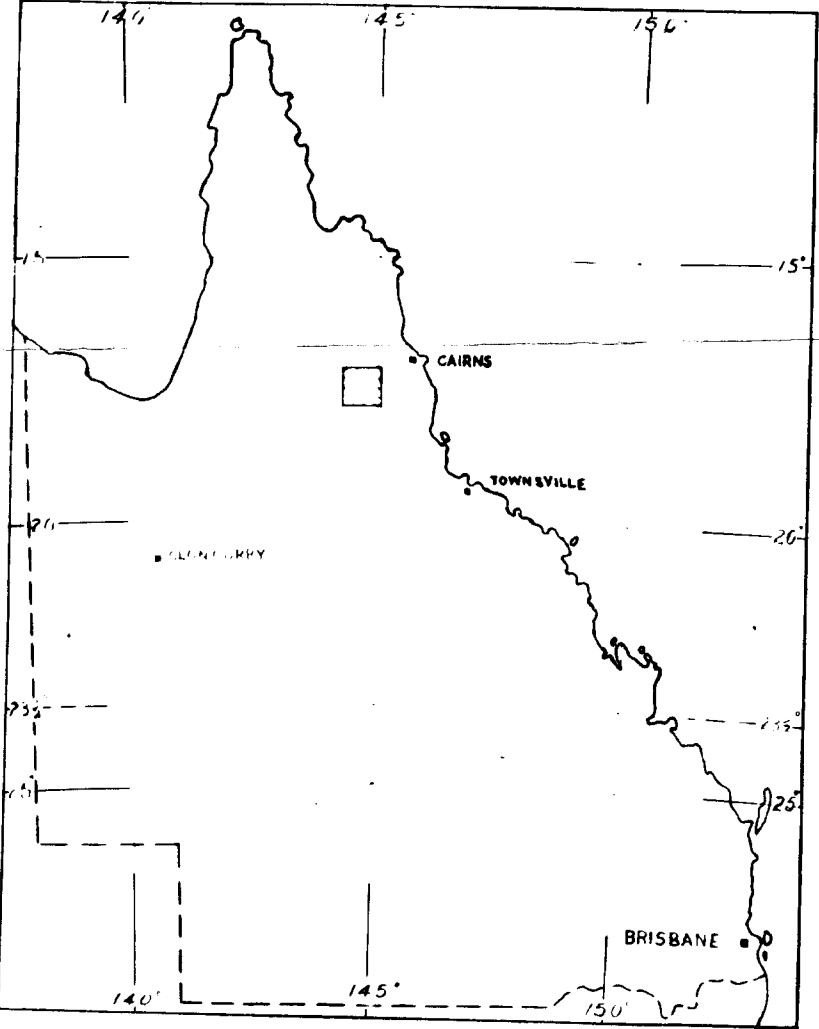
SCALE



REFERENCE

- Geochemical drainage sample locality (No 37)
- Sample locality listing higher than average elements (Sn, Cu)
- Mine working 1961
- Mine abandoned
- Alluvial mining working
- Alluvial mining abandoned
- Main roads formed
- Main road not formed
- Vehicle track
- Railway
- Town or Siding
- H.S. Homestead

LOCALITY MAP

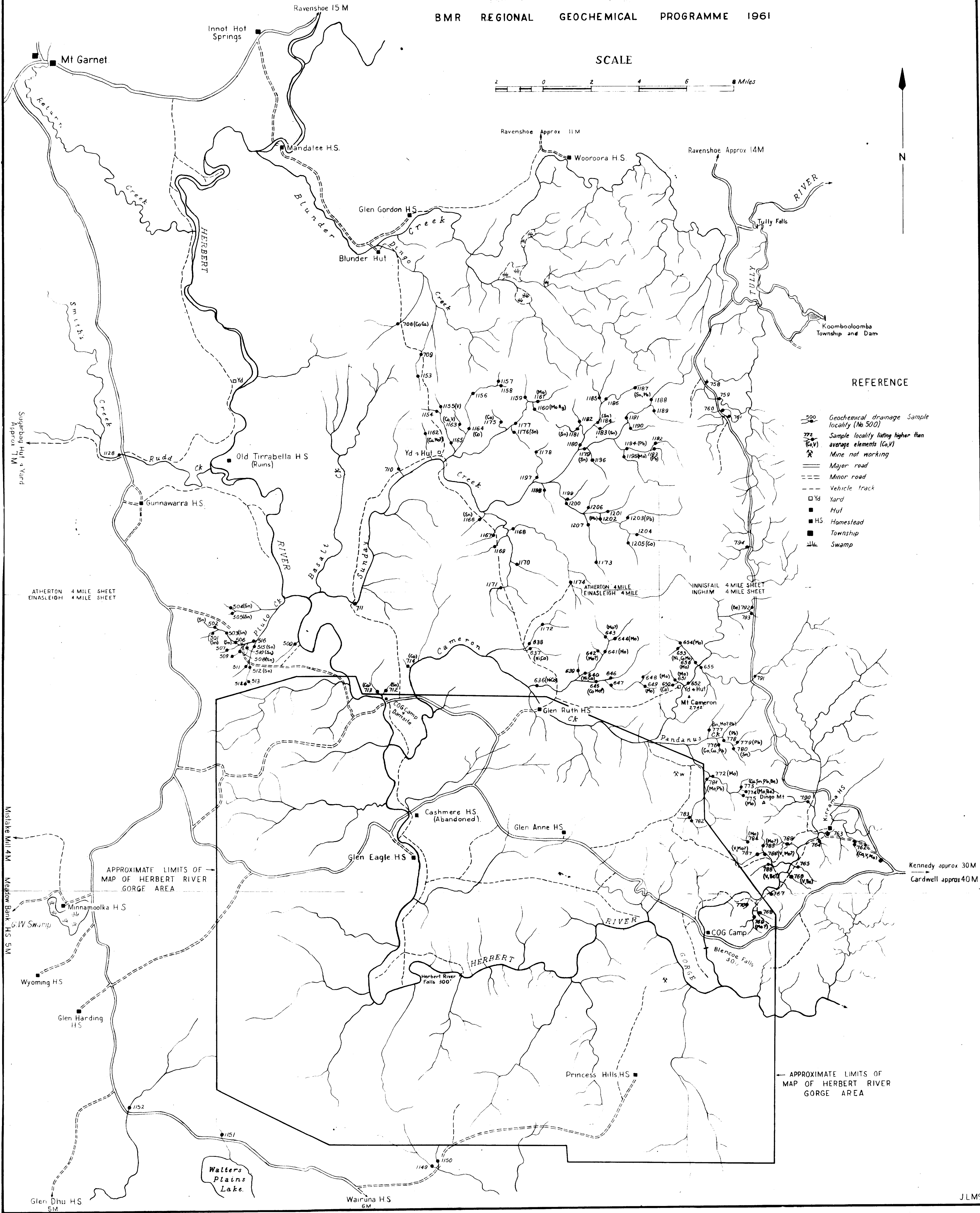


MT GARNET-HERBERT RIVER GORGE AREA

NORTH QUEENSLAND

GEOCHEMICAL SAMPLING LOCALITIES

BMR REGIONAL GEOCHEMICAL PROGRAMME 1961



REFERENCE

- 500 Geochemical drainage Sample locality (No 500)
- 772 Sample locality lying higher than average elements (Co, V)
- (Co, V) Mine not working
- == Major road
- Minor road
- - - Vehicle track
- Yd Yard
- Hut
- HS Homestead
- Township
- ≡ Swamp

HERBERT RIVER GORGE AREA

NORTH QUEENSLAND

GEOCHEMICAL SAMPLING LOCALITIES

BMR REGIONAL GEOCHEMICAL PROGRAMME 1961

PLATE 3.

