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RECORDS:

1965/143

GEOCHEMICAL SAMPLING OF THE GOLDEN MILE AND JUBILEE AREAS, TENNANT CREEK. NORTHERN TERRITORY.

by

R.R. Harding and D. Dunnet

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CONTENTS

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SUMMARY

Samples of jasper and quartz-hematite from the Golden Mile and Jubilee Mine areas in the Tennant Creek 1-mile Sheet were analysed semi-quantitatively for Cu, Co, Pb, Zn, Bi, and Mo. The results obtained were compared with those from regional ironstone sampling carried out to the north on the Mt. Woodcock 1-mile Sheet area. No significantly high values of Cu, Co, Pb, or Zn were found at the Golden Mile and it is probably not worthwhile exploring the area further for these elements; one high Bi value and two high Mo values were recorded. Economic concentrations of Bi are known from the Jubilee Mine and are indicated in this survey. Although the ironstones south of the mine indicate Bi concentrations higher than background, it is unlikely that concentrations as high as those in the mine are present. There is no geochemical indication of an economic concentration of Cu near the Jubilee Mine although the Cu concentrations of some of the ironstones are above the Tennant Creek ironstone 'background' concentrations.

INTRODUCTION

Part of the Bureau of Mineral Resources geochemical exploration programme at Tennant Creek in 1964 was to sample ironstones and jaspers in the Mt. Woodcock, Marion Ross, Hayward Creek and 5/217 1-mile Sheet areas. In addition samples of ironstone and jasper were collected from the Golden Mile and Jubilee areas on the Tennant Creek 1-mile Sheet area. This record is a brief account of the results of the latter two programmes.

THE GOLDEN MILE AREA:

Introduction: Quartz, quartz-hematite, and jasper crop out as irregularly shaped bodies in cleaved and folded Warramunga Group shales and siltstones in a roughly east-west zone. They are mostly elongated parallel to the cleavage, and in places occur in groups probably parallel to bedding of the surrounding sediments, (localities 4, 6, and 14 on Plate 1).

Small amounts of gold have been won from the Bluebird (locality 1), the Perseverance (locality 3), and from the Golden Mile (localities 5 and 6) prospects. No mining has been carried out since 1953 and previous mining in the area is summarised in Ivanac (1954). The area was geologically mapped on a scale of 1:12,000 by Crohn & Oldershaw (1965).

Sampling: Two chip samples of quartz-hematite and two of jasper were collected from each quartz-jasper-hematite outcrop and combined into composite samples. The distribution of ironstone outcrops and the way in which samples from different outcrops were combined for analysis are shown in Plate 1. The composite samples were crushed to -80 mesh and semi-quantitatively analysed on an optical emission spectrograph for Cu, Co, Pb, Zn, Mo, and Bi by A.M.D.L. of Adelaide.

Results: The results are shown in Plate 1.

There are too few results in the Golden Mile area to determine statistically whether any of the results are anomalously high. They are therefore compared to those from ironstones in the northern part of the Tennant Creek Goldfield for which cumulative frequency diagrams have been constructed (Plates 2 and 3). Plates 2 and 3 indicate that the lowest values for anomalously high populations of each of the six elements are:

Cu	500 p.p.m.
Co	250 p.p.m.
Pb	?50 p.p.m.
Zn	200 p.p.m.
Bi	300 p.p.m.
Mo	70 p.p.m.

If these limits are valid for the Golden Mile area there are no anomalously high concentrations of Cu, Co, Pb, and Zn in the area; Bi is anomalously high at locality 3, and Mo at localities 6 and 7.

The molybdenum concentrations at localities 6 and 7 are near the lower limits of the upper population and, considering the low concentrations of the other elements, are not worth exploring further. Locality 3 (Perseverance Mine), the only Bi anomaly, has yielded 192 ozs. of gold and has been abandoned. The low Cu and Co concentrations indicate that exploration for Cu would not be justified.

THE JUBILEE MINE AREA:

Introduction: The Jubilee Mine area lies approximately five miles west of the Tennant Creek airport. It consists of two prominent ridges of jasper and quartz-hematite which occupy approximately the same stratigraphic level in a shallow east-plunging syncline. The mine has been worked for both bismuth and gold and is known to contain bismuth concentrations of up to 2%. Crohn & Oldershaw (1965) discuss the geology of the area and consider that most of the jasper and quartz-hematite bodies of this area are the result of contact effects of the underlying quartz-feldspar porphyry, but the lodes in the immediate vicinity of the Jubilee Mine have been emplaced in a major structural feature, probably a shear zone, trending a few degrees south of east.

Sampling: Groups of chip samples (6 to 10 chips) were taken from each 100 to 300 foot section of the outcropping ironstones. In composite bodies, containing both quartz-hematite and jasper, chip samples of each were collected and analysed separately. Several colluvium and stream sediment samples were also collected.

The chip samples were crushed to -80 mesh and semi-quantitatively analysed for Cu, Co, Pb, Zn, Mo, and Bi at A.M.D.L., Adelaide.

Results: The results are shown in Table 1, the position of samples on Plate 4, and Cu and Bi values on Plates 5 and 6.

A total of 58 samples was collected from the Jubilee area; 41 being quartz-hematite or jasper chip samples and 17 stream or colluvium samples.

From Plate 7 it can be seen that the chip samples may be divided into two populations on the % cumulative frequency diagrams (Pritchard, 1964; Dunnet & Harding, 1965). Plates 5 and 6 are contoured at the upper limit of the lower population of Cu and Bi, so that the isochemical contours define areas of the upper population. From these Plates it is clear that the high Bi population has a wider distribution than that for Cu. Other than the immediate vicinity of the mine, the most favourable Cu and Bi area is on the southern line of ironstone due south of the mine. Structurally this is a favourable area for mineralisation: the mine rocks are repeated across the syncline, and the area is within the shear zone which crosscuts the northern ridge in the vicinity of the mine (see Plate 4).

McMillan & Debnam (1958) collected and analysed 140 samples from Tennant Creek ironstones; % cumulative frequency distribution curves for Cu concentrations in these samples and in the 41 samples collected in 1964 are closely similar in form but differ in position (absolute concentration of Cu) - see Plate 7. The difference in Cu concentration may be attributed to different methods of analysis (wet chemical and emission spectrographic).

The results obtained from the Jubilee area were compared to the populations defined by regional sampling of ironstones to the north of the Tennant Creek 1-mile Sheet area (Dunnet & Harding, 1965). In this regional survey two populations were defined for all elements, but the values of population limits were much higher than those derived from the Jubilee suite. Jubilee samples with significant values relative to the regional figures are indicated in the table of results. Mo and Pb are well above regional background, three Bi samples are significantly high (29, 47, and 51), and five Cu and five Co samples appear to be significantly high.

The Cu/Co relationship observed at Northern Star (Dunnet, 1965) is not apparent in the Jubilee suite. Only one sample shows significantly high values of more than two elements (28), and this was obtained from the vicinity of the Jubilee Mine.

Conclusions: The results are not encouraging other than in the immediate vicinity of the Jubilee Mine. There is no geochemical indication of economic concentrations of Cu in the ironstones. Economic concentrations of Bi are known from the Jubilee Mine, and are indicated in this survey. The ironstones to the south of the Jubilee Mine indicate Bi concentrations higher than background. Although this southern area warrants further investigation, it is unlikely that concentrations as high as those in the Mine area will be found.

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TABLE 1

BISMUTH ANALYSES FROM JUBILEE MINE, TENNANT CREEK, N.T.

Samples collected by P.G. Dunn, Resident Geologist, T.C.

Analyses by M.R. Hanckel, A.M.D.L. 22/11/61

Sample No.	% Bismuth	Location
J1	1.55%	Across face of drive off No. 2 Shaft
J2	0.29%	
J3	6.20%	
J4	0.17%	
J5	0.11%	
J6	0.63%	Across face of winze from above drive
J7	5.05%	
J8	0.17%	
J9	0.065%	
J10	0.07%	
J11	2.20%	Across eastern side of foot of No. 2 shaft
J12	2.35%	
J13	1.15%	
J14	2.70%	Mine dump
J15	1.80%	

TABLE 2

LIST OF GEOCHEMICAL RESULTS - JUBILEE MINE, TENNANT CREEK

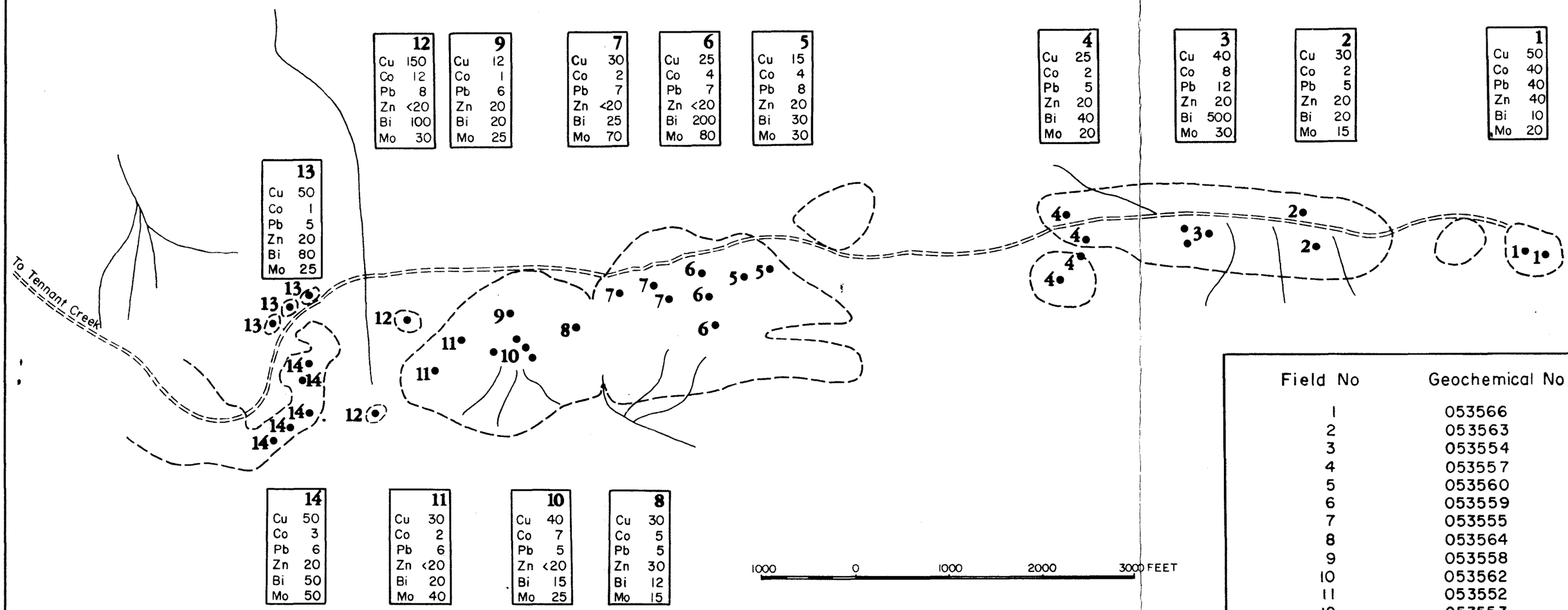
Sample No.	Sample Position No.	Grid Position	Copper p.p.m.	Cobalt p.p.m.	Lead p.p.m.	Zinc p.p.m.	Molybdenum p.p.m.	Bismuth p.p.m.
053103	1	182830, 2540960	150	15	25	50	150	8
104	2	182820, 2540980	150	8	30	30	30	8
105	3	182790, 2541000	70	2	20	30	40	12
106	4	182710, 2540990	80	3	30	25	150	150
107	6	182610, 2541020	70	4	30	25	40	7
108	7	182630, 2541010	25	1	25	20	60	60
109	8	182490, 2541100	70	2	15	25	100	150
110	9	182520, 2541020	60	1	15	20	100	20
111	12	182480, 2541010	40	1	20	20	70	25
112	13	182420, 2541010	100	7	20	20	60	7
113	14	182390, 2541110	50	7	15	30	150	15
114	16	182290, 2540100	40	1	12	<20	30	60
115	17	182210, 2541110	50	15	15	30	30	50
116	18	182140, 2541120	50	15	10	30	60	40
117	20	182290, 2541110	80	4	15	30	80	50
118	21	182330, 2541120	20	<1	10	20	30	40
119	22	181960, 2541040	200	20	15	20	30	40
120	24	181440, 2540820	200	15	25	30	20	40
121	25	181490, 2540820	100	12	10	30	30	150
122	26	182960, 2540950	60	4	10	25	20	5
123	27	183020, 2540950	60	4	20	25	15	4
124	28	182960, 2541000	200	80	12	250	40	40
125	29	183000, 2541000	100	20	150	30	60	5000
126	30	183060, 2540990	40	4	20	30	60	150
127	33	183100, 2540980	50	4	20	30	60	50
128	34	183210, 2549700	80	40	30	30	50	60
129	35	183100, 2540930	60	4	20	25	25	12
130	36	183140, 2540960	400	6	15	20	150	60
131	37	183320, 2540920	8	4	20	20	2	2
132	38	183350, 2540930	25	5	12	20	3	5
133	39	183390, 2540930	40	5	12	30	50	<1
134	40	183400, 2540850	50	6	15	250	40	10
135	43	183650, 2540860	40	6	15	25	40	8
136	44	183310, 2540300	80	2	15	<20	60	250
137	45	183220, 2540430	300	4	15	<20	60	100
138	47	183040, 2540590	80	5	15	25	80	300
139	48	182990, 2540680	150	30	20	30	70	80
140	50	182910, 2540690	80	40	20	30	70	70
141	51	182800, 2540710	70	2	20	<20	30	600
142	52	182680, 2540760	60	25	20	30	70	80
143	53	182590, 2540790	60	50	40	25	60	200
Soil Samples								
051297	5	182720, 2541030	15	35	15	<20	3	15
298	10	182590, 2540980	20	4	15	40	1	7
299	11	182560, 2541210	15	4	15	<20	2	4
300	15	182330, 2540980	12	5	12	<20	2	4
301	19	182120, 2541050	12	3	15	20	2	4
302	23	181610, 2541000	15	2	12	<20	2	5
303	31	183130, 2540920	20	8	15	<20	3	6
304	32	183120, 2540830	12	4	12	<20	2	4
305	41	183580, 2540840	15	3	15	20	2	4
306	42	183520, 2541120	15	3	12	20	1	3
307	46	183320, 2540410	15	3	15	20	2	3
308	49	182910, 2540740	10	1	12	20	1	4
309	54	182690, 2540850	10	1	10	20	1	5
310	55	182520, 2540910	10	1	12	20	1	3
311	56	182970, 2540920	10	2	15	<20	2	4
312	57	182930, 2541090	10	1	10	20	1	8
313	58		10	2	8	<20	1	3

—— Value in upper element population

– – – Value possibly in upper element population (after Dunnet & Harding, 1965

THE GOLDEN MILE TENNANT CREEK GOLDFIELD N.T.

Cu, Co, Pb, Zn, Bi and Mo results from chip sampling of ironstones and jaspers



Field No	Geochemical No
1	053566
2	053563
3	053554
4	053557
5	053560
6	053559
7	053555
8	053564
9	053558
10	053562
11	053552
12	053553
13	053565
14	053556

Cu	50
Co	40
Pb	40
Zn	40
Bi	10
Mo	20

Composite Sample No

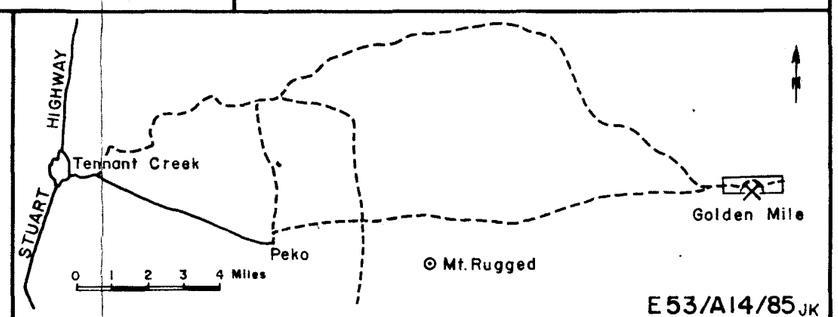
Concentrations of elements in p.p.m.

Creek

Area of outcrop, surrounded by buildust

Unsealed Road

Outcrop of ironstone and jasper sampled for analysis.



Bureau of Mineral Resources, Geology and Geophysics. March 1965. To accompany Record 1965/

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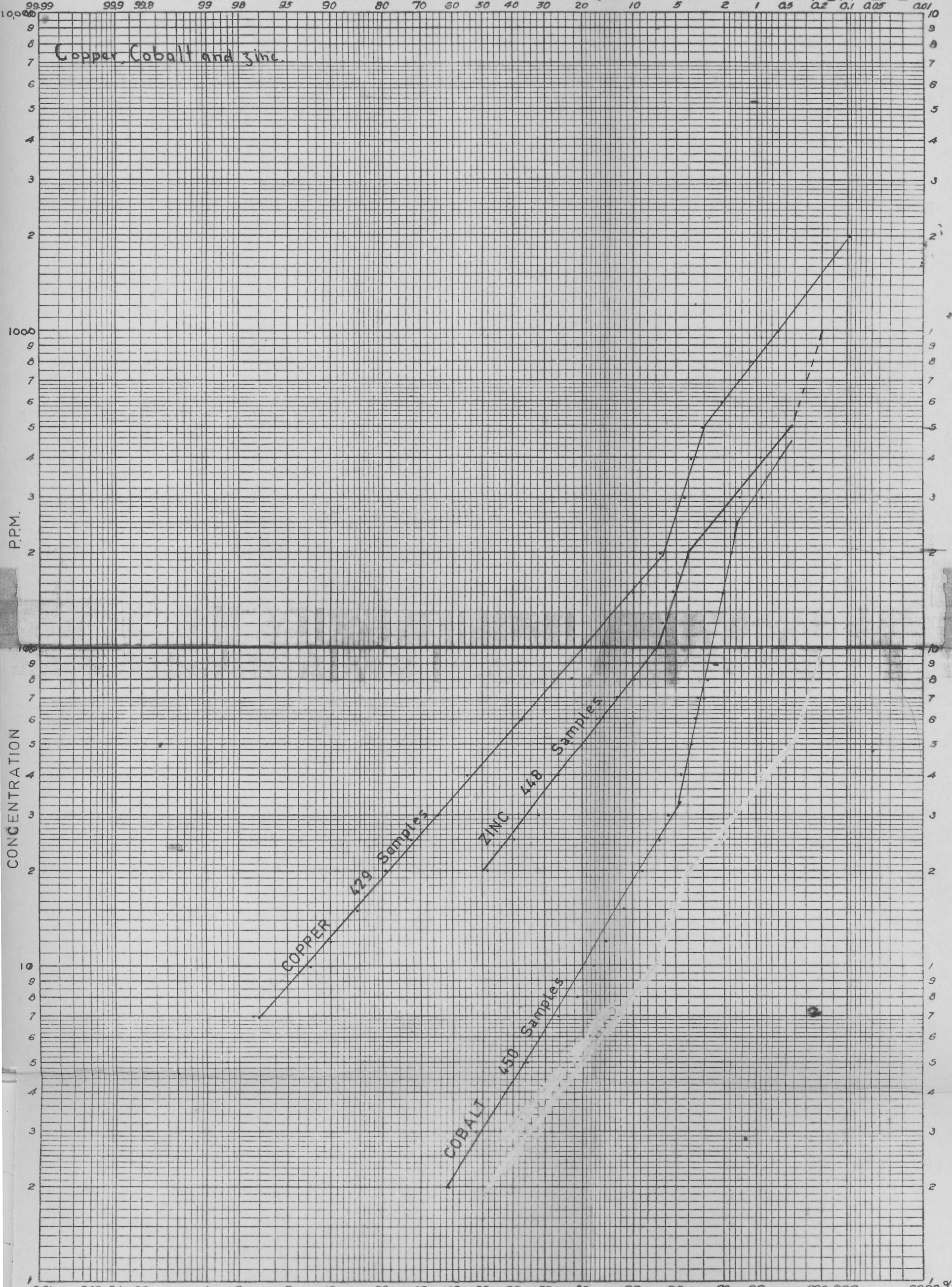
TENNANT CREEK REGIONAL IRONSTONE SAMPLING.

Geochemistry - % Cumulative frequency Distribution.

PLATE 2

Copper, Cobalt and Zinc.



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TENNANT CREEK REGIONAL IRONSTONE SAMPLING.

Geochemistry – % Cumulative Frequency Distribution.

PLATE 3

Lead, Molybdenum & Bismuth.

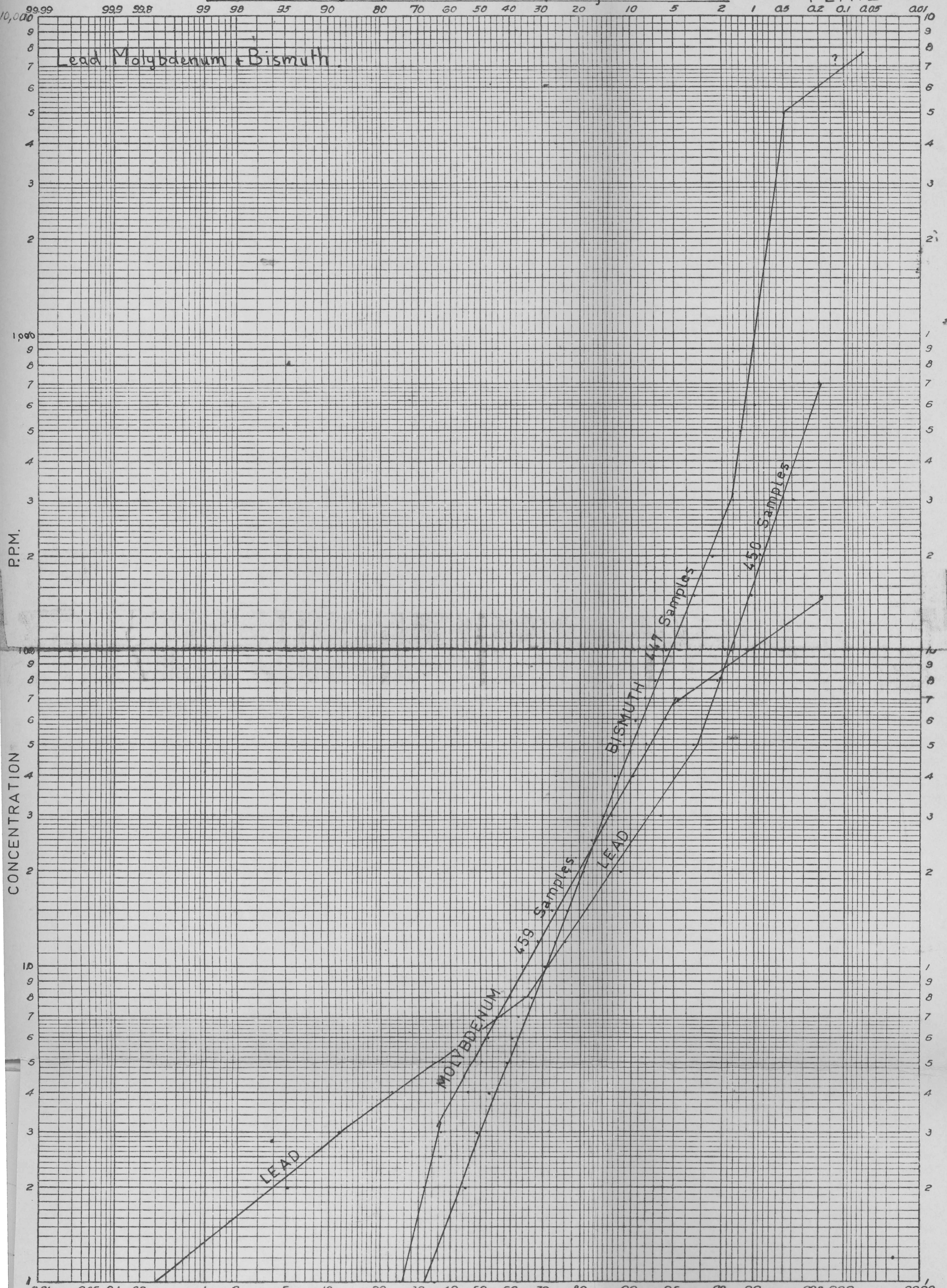

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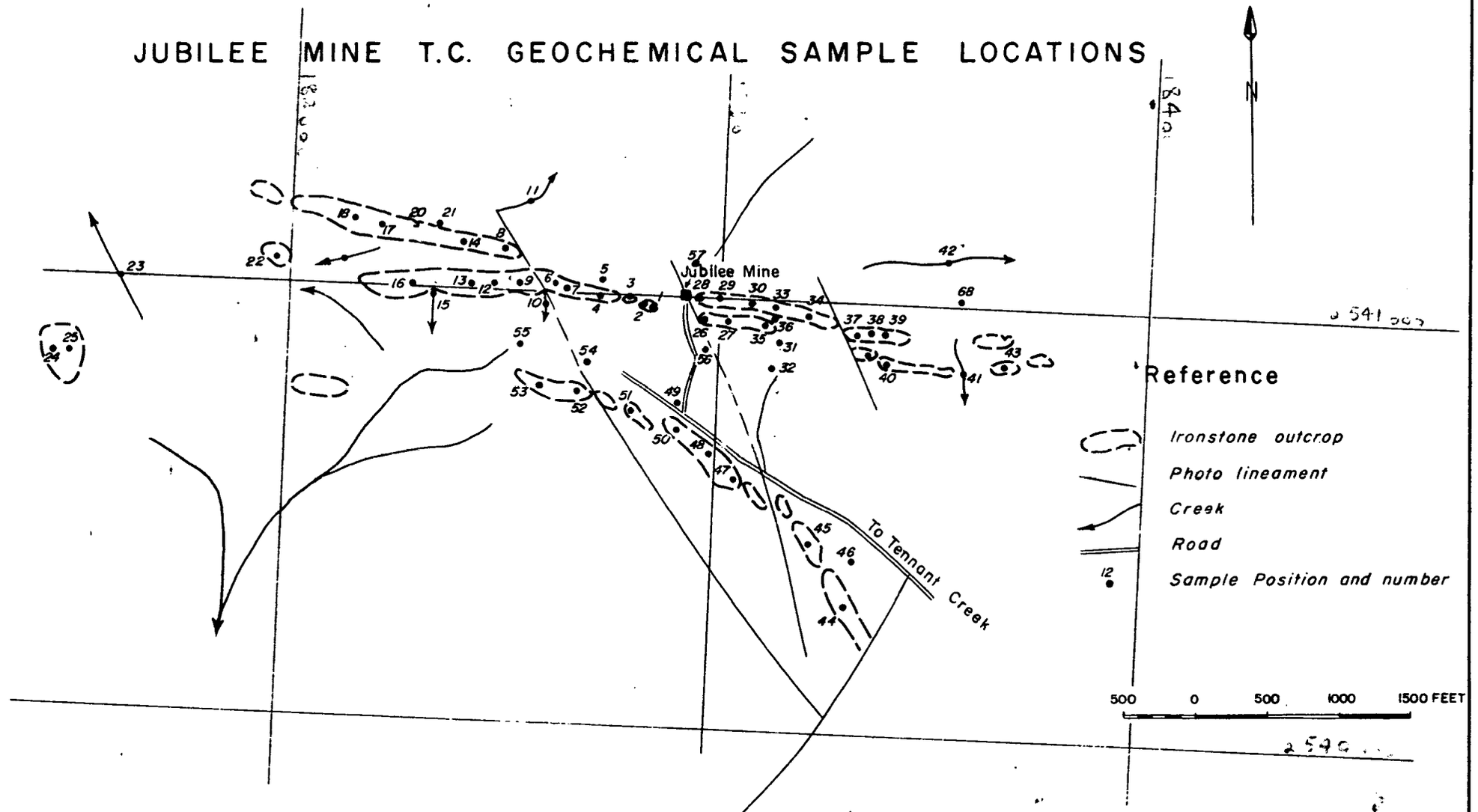
PLATE 1

JUBILEE MINE T.C. GEOCHEMICAL SAMPLE LOCATIONS



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E53/A14/86

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PLATE 5.

JUBILEE MINE T.C. OVERLAY No 1 - BISMUTH

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E 53/A14/87

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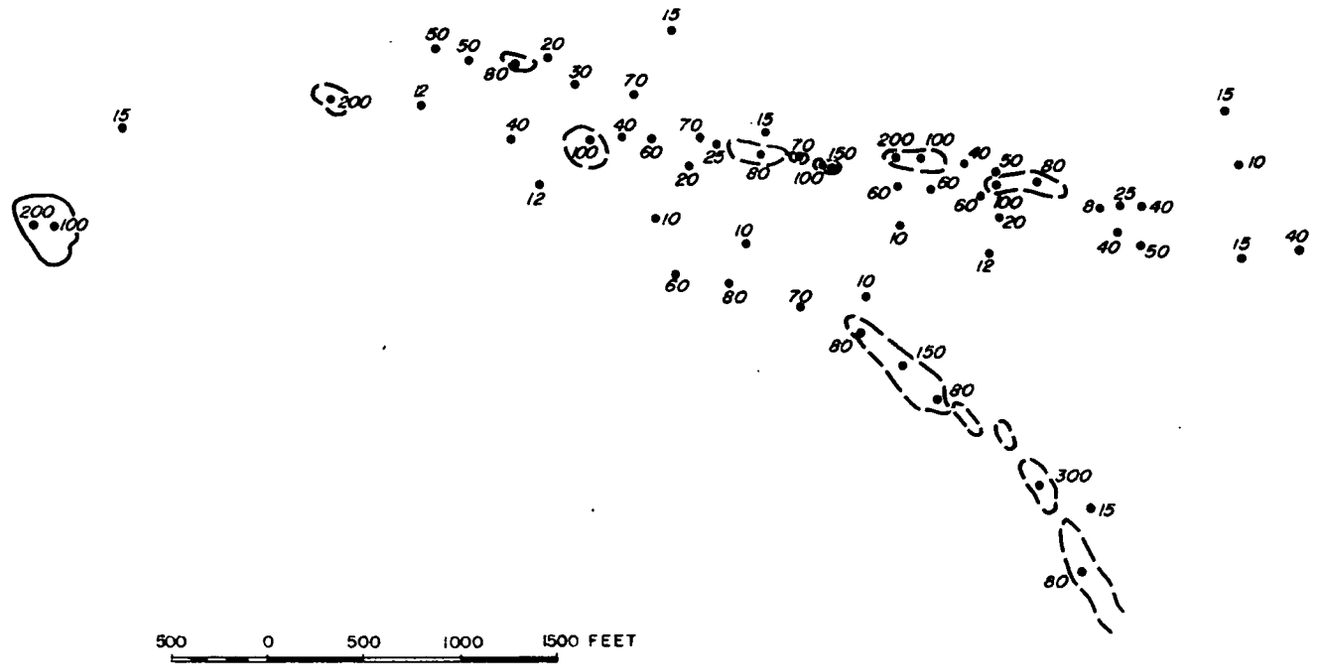
PLATE 6

JUBILEE MINE T.C. OVERLAY No 2 - COPPER



Reference

80 Sample Position and Copper Concentration

Geochemical Contour 70 p.p.m. Copper.

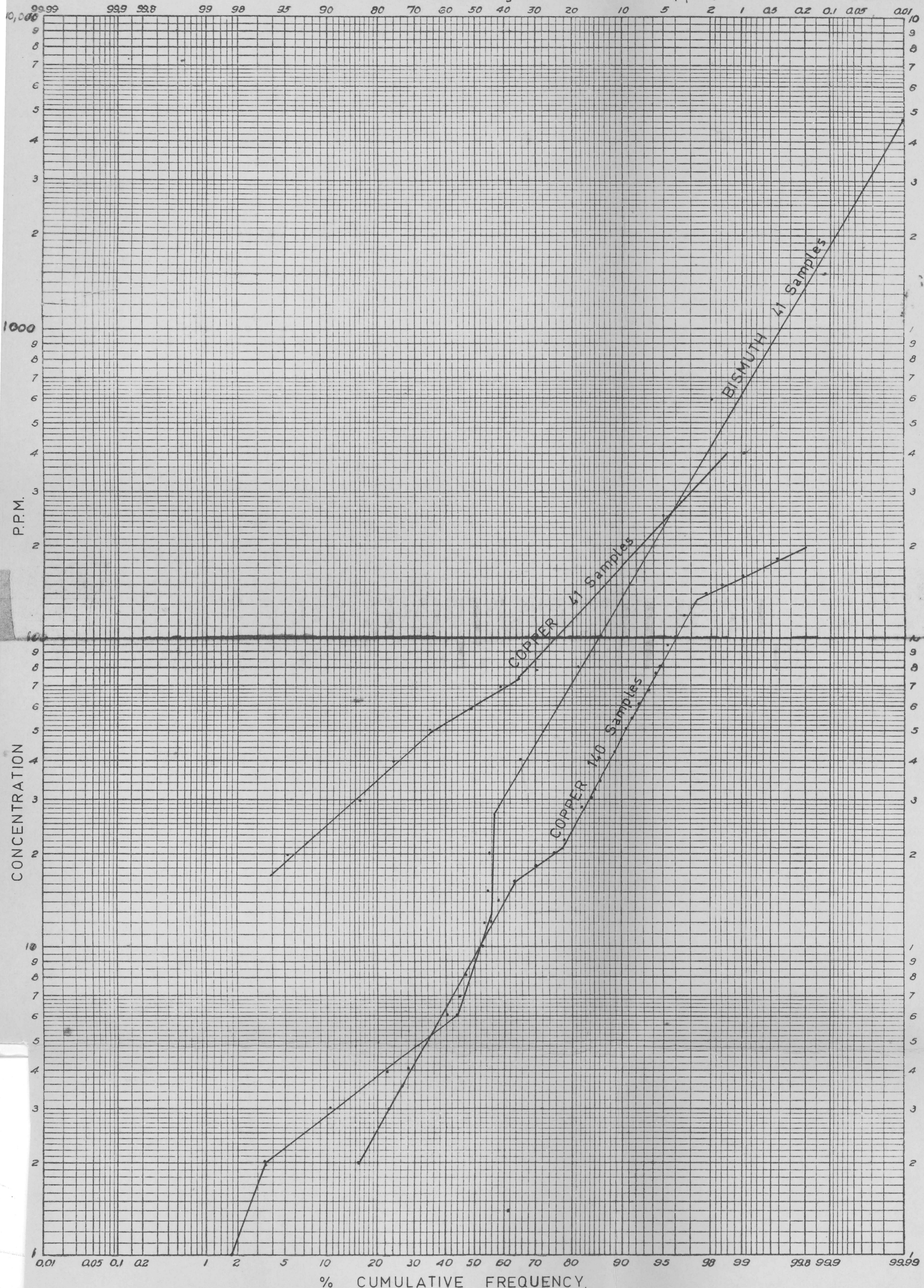
Bureau of Mineral Resources, Geology and Geophysics. March 1965 To accompany Record 1965/

E53/A14/88 JK

JUBILEE MINE TENNANT CREEK.

% Cumulative Frequency Distribution – Copper, Bismuth.

PLATE 7



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