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PRINCESS RIVER AREA
QUEENSTOWN
Detailed Geochemical Sampling

H. Smith
March 1968

AMG REFERENCE POINTS ADDED

PRINCESS RIVER AREAGeology and Stream-Sediment Sampling Report.GENERAL

The Princess River is a tributary of the King River and the area under investigation is situated north of the Lyell Highway, approximately 8 miles east of Queenstown.

A reconnaissance stream-sediment sampling survey towards the end of 1967 revealed an area of high zinc values (up to 675 ppm with accompanying high lead values up to 150 ppm).

A detailed stream-sediment survey was then conducted to check these high values. The results of this showed a well defined drainage amphitheatre with zinc values up to 1000 ppm and lead values up to 400 ppm with many nickel values over 100 ppm.

Recently, several days were spent in the head-water regions of the streams involved resampling, taking new samples further upstream than previously, and taking numerous rock and soil samples from the stream banks and divides.

PHYSIOGRAPHY

The area consists of low, rounded, well soiled hills with limited rock outcrop, except in stream beds.

The valley heads are very densely forested (rain forest), while the lower valleys near the Princess River are flat with dense, but low, "cutting grass" vegetation. The summits of divides are generally grassed, but may also be covered by bracken fern, and provide the best means of access to the upper reaches of the Princess River. The streams (except in headwaters) are slow flowing and consist of smoothed, flat Bell Shale pebbles and quartz gravels and sand.

GEOLOGY

The area under investigation is wholly underlain by Devonian "Bell Shale" with a predominantly N-S strike with folds of a wave-length of 5000 feet. The shales are thinly foliated, but the texture varies greatly - from very fine, shaley rocks to coarse grained greywackiferous massive rocks, though the former predominate.

To the north of the area (approximately 20,000 feet), Jurassic dolerite outcrops on the summit of the Eldon Range. Some dolerite boulders (probably from this source) were found in the lower reaches of the Princess River south of the main zinc-lead anomaly zone. No other source of dolerite is known, but in the past it may have formed a capping on the adjacent hills whose summits are not far below the base of the dolerite on the Eldon Range.

The wide, flat area around the Princess River is of recent alluvials (consisting of pale to dark grey sandy soil with Bell Shale and quartz pebbles).

There are no old diggings in the area.

GEOCHEMICAL SAMPLING RESULTS

To check the high zinc and lead results obtained in reconnaissance stream-sediment surveys, numerous rock and soil samples were taken from stream banks and the divides between streams where the high values were obtained. Also, some streams were re-sampled and sampled further upstream from the original sample points.

From eighteen samples of Bell Shale located in the high zinc-lead zone, the following average results were obtained on analysis:

Copper	32 ppm (range 15-45 ppm)
Zinc	76 ppm (range 35-140ppm)
Lead	16 ppm (range 0-20 ppm)
Nickel	63 ppm (range 20-150 ppm)
Arsenic	5 ppm (range 0-20 ppm)

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Geochemical Sampling Results (continued)

Analysis of five Bell Shale specimens from south of the zinc-lead anomalous zone did not differ appreciably from those obtained in the zone.

Analysis of two specimens of Jurassic dolerite obtained from within the zone and out of the zone showed:

Copper	100 ppm	(in the zone),	85 ppm	(out of zone)
Lead	15 ppm	" " "	0 ppm	" " "
Zinc	140 ppm	" " "	20 ppm	" " "
Nickel	110 ppm	" " "	40 ppm	" " "
Arsenic	20 ppm	" " "	5 ppm	" " "
Cobalt	30 ppm	" " "	5 ppm	" " "

Check stream results were similar to those obtained in the reconnaissance survey, and soil results were similar both from within and out of the zone.

RECOMMENDATIONS AND CONCLUSIONS

As rock analyses of Bell Shale failed to show any differentiation between the high zinc-lead zone and any other low zinc-lead zone, the anomalous zone cannot be explained by high background values of the Bell Shale, even though the general background for zinc is high (av. 76 ppm).

The high values for lead cannot be explained from background values, as all values for lead are low in the Bell Shale.

Although the background for zinc is high in dolerite specimens obtained within the high anomaly zone, no reason can be seen why there should be differentiation of dolerite boulders along the Princess River valley into high-zinc and low-zinc zones.

The high lead values obtained from stream-sediment samples is in sharp contrast to the low values obtained in soil and rock samples.

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Recommendations and Conclusions (continued)

Therefore, the recent survey in the area has not solved the problem as to the origin of the high zinc and lead values obtained from stream-sediment samples.

Further investigations in the upper reaches of the Princess River may prove fruitful but this will mean camping out for four to five days because of the distances involved and the difficulty of traversing the terrain. At the moment this is impracticable because of weather conditions.

These investigations could take the form of detailed ground surveys of geology and intensive rock sampling with subsequent analysis.

H. Smith
3 April, 1968.

TABLE 1

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Richard Maltby

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GEOCHEMICAL STREAM SEDIMENT SAMPLES

PRINCESS RIVER AREA

*Plans Geological
Drafting*

Sample No.	Nickel	Copper	Lead	Zinc
778246	30	70	180	100
247	85	45	100	675
248	60	35	50	400
249	70	30	40	400
250	80	40	100	600
275	50	40	100	85
276	110	80	100	550
277	55	45	140	290
278	100	65	150	500
279	290	150	135	1000
280	150	125	290	480
281	140	110	150	500
282	25	50	90	50
283	85	80	125	500
284	50	125	400	250
296	90	45	90	350
297	70	70	120	400
299	40	60	110	100
300	100	95	200	600
301	45	60	150	210
302	35	70	180	260
303	100	115	220	680
304	110	85	175	570
305	100	90	190	650
306	150	95	150	300
307	35	65	105	70
308	30	50	100	55
309	25	55	100	60
608	90	25	15	85
609	110	30	-	100
610	100	35	-	90
611	140	100	220	130
612	150	40	5	100
613	145	70	130	120
614	110	100	15	140

ppm??

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Geochemical Stream Sediment Samples
Page Two.

Princess River Area

Sample No.	Nickel	Copper	Lead	Zinc
778615	50	30	-	85
616	70	20	5	90
617	30	35	-	35
618	75	15	5	40
619	20	15	15	20
620	25	25	5	65
621	20	30	120	35
622	85	60	100	120
623	90	45	-	120
624	7	15	10	15
625	10	10	10	25
626	10	15	-	20
627	10	5	5	15
628	40	85	-	20
631	25	45	20	25
632	30	65	190	90
633	50	30	-	45
634	20	20	-	30
635	35	40	5	40
636	15	40	20	20
637	25	40	60	100
638	25	20	10	30
639	65	85	280	120
640	80	40	20	110
641	55	30	15	100
642	55	30	20	90
643	55	30	20	100
644	70	40	15	110
645	40	35	20	100
646	10	15	5	40
647	15	20	10	40

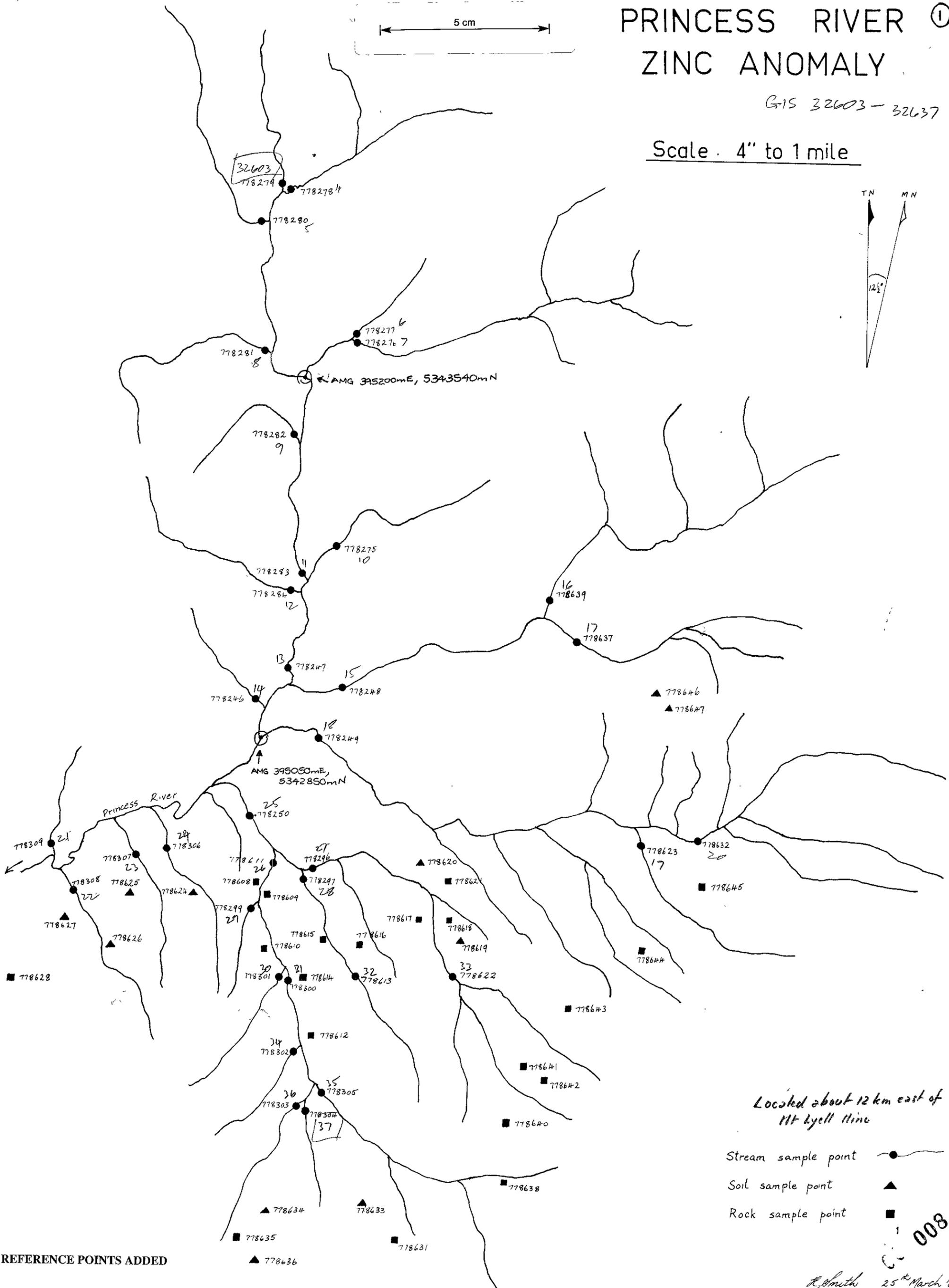
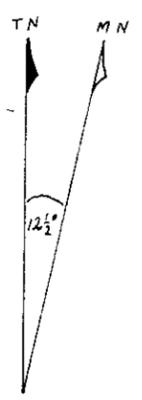
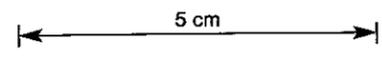
LIST OF MAPS:

1. Princess River – Zinc Anomaly 4 inch : 1 mile
2. Princess River – Zinc Anomaly
Geology 4 inch : 1 mile
3. Princess River – Zinc Anomaly
Nickel Values 4 inch : 1 mile
4. Princess River – Zinc Anomaly
Copper Values 4 inch : 1 mile
5. Princess River – Zinc Anomaly
Cold Copper Values 4 inch : 1 mile
6. Princess River – Zinc Anomaly
Lead Values 4 inch : 1 mile
7. Princess River – Zinc Anomaly
Zinc Values 4 inch : 1 mile

PRINCESS RIVER ① ZINC ANOMALY

G15 32603 - 32637

Scale . 4" to 1 mile



AMG REFERENCE POINTS ADDED

Located about 12 km east of
Mt Lyell Mine

Stream sample point ●
Soil sample point ▲
Rock sample point ■

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L. Smith 25th March '68

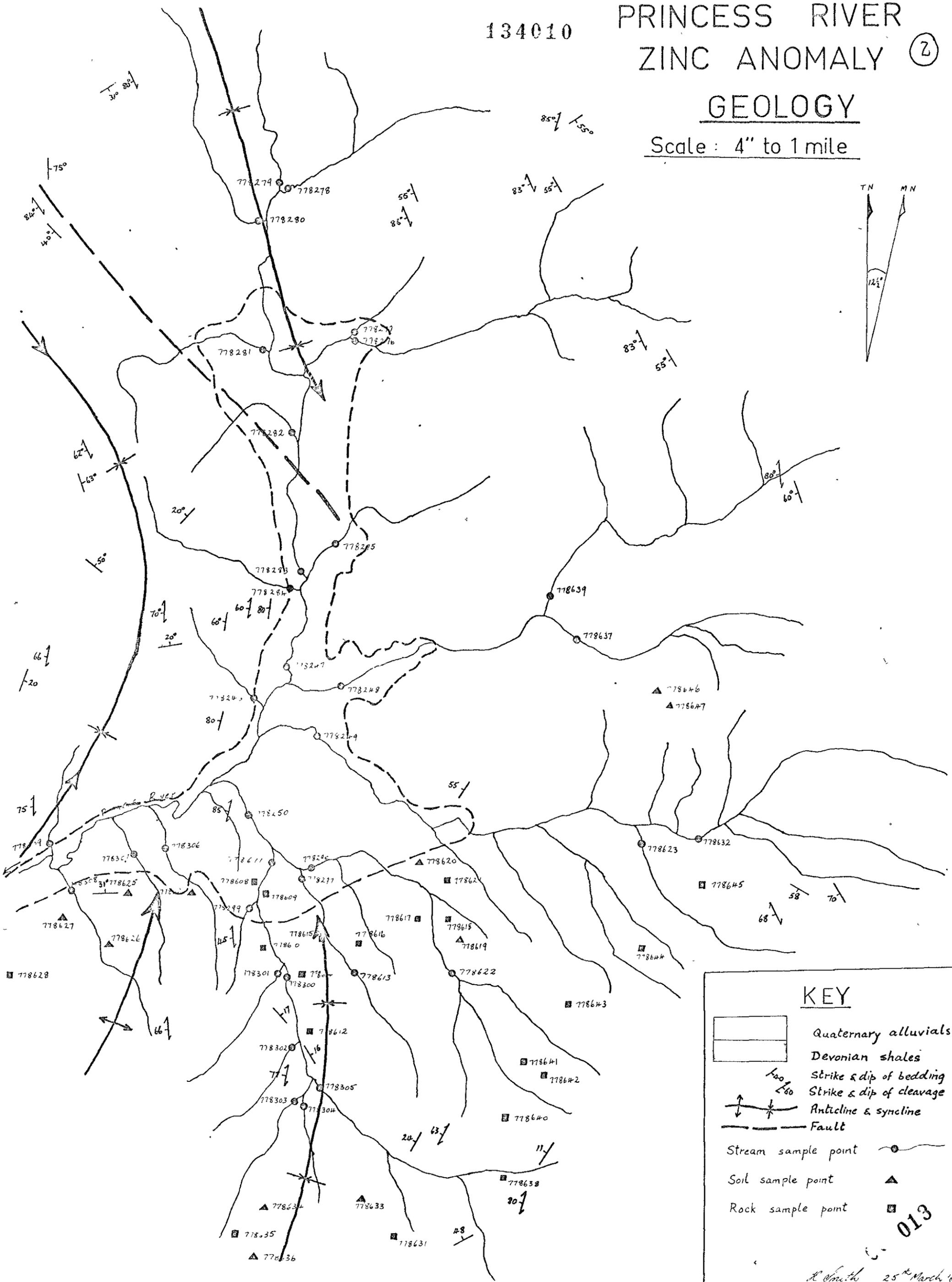
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PRINCESS RIVER

ZINC ANOMALY (2)

GEOLOGY

Scale: 4" to 1 mile



KEY

- Quaternary alluvials
- Devonian shales
- Strike & dip of bedding
- Strike & dip of cleavage
- Anticline & syncline
- Fault
- Stream sample point
- Soil sample point
- Rock sample point

R. Smith 25th March '00

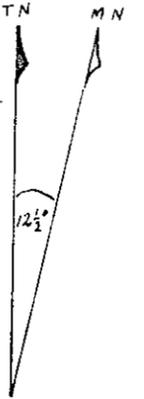
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PRINCESS RIVER ZINC ANOMALY ③

134011 NICKEL VALUES

Scale: 4" to 1 mile

5 cm

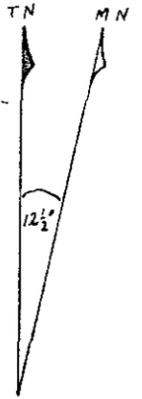


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R. Smith 25th March '68

134012 PRINCESS RIVER
ZINC ANOMALY ④
COPPER VALUES

Scale: 4" to 1 mile



KEY

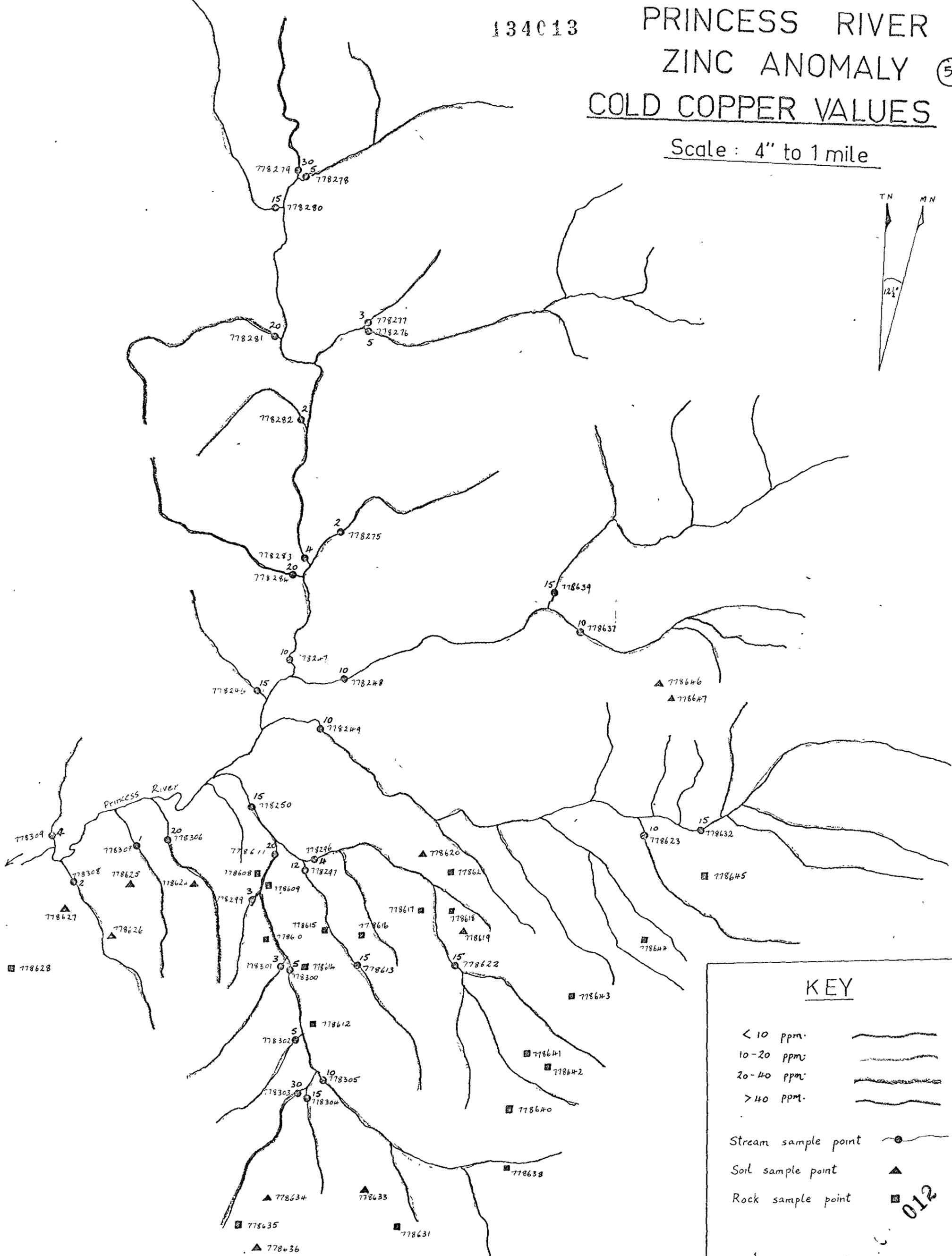
- < 25 ppm. [wavy line]
- 25 - 50 ppm. [double wavy line]
- 50 - 100 ppm. [triple wavy line]
- > 100 ppm. [thick wavy line]
- Stream sample point [circle with dot]
- Soil sample point [triangle]
- Rock sample point [square]

L. Smith 25th March '68

134013

PRINCESS RIVER ZINC ANOMALY ⑤ COLD COPPER VALUES

Scale: 4" to 1 mile



KEY

- < 10 ppm.
- 10-20 ppm.
- 20-40 ppm.
- > 40 ppm.
- Stream sample point
- Soil sample point
- Rock sample point

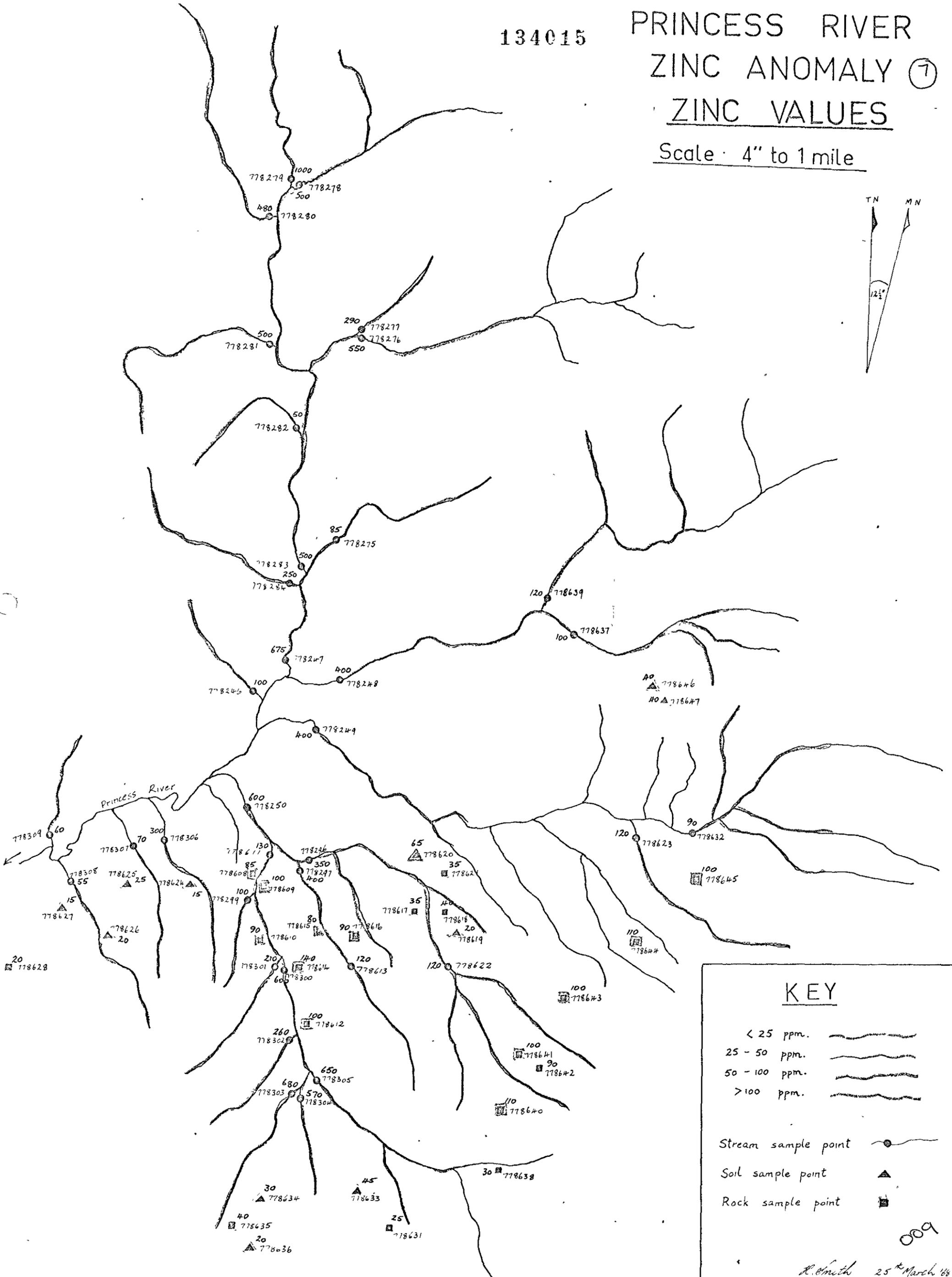
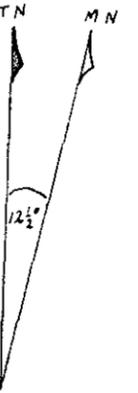
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R. Smith 25th March '68

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PRINCESS RIVER ZINC ANOMALY ⑦ ZINC VALUES

Scale · 4" to 1 mile



KEY

- < 25 ppm.
- 25 - 50 ppm.
- 50 - 100 ppm.
- > 100 ppm.
- Stream sample point
- Soil sample point
- Rock sample point

R. Smith 25th March '68