'79-#48-#7160

REPORT ON THE STREAM SEDIMENT AND SOIL FOLLOW-UP SURVEY AT ANOMALY 3A, KETTLE RIVER AREA BRITISH COLUMBIA

FOR KELVIN ENERGY LIMITED
CALGARY, ALBERTA

BARRIN

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REPORT ON THE STREAM SEDIMENT AND SOIL FOLLOW-UP SURVEY AT ANOMALY 3A, KETTLE RIVER AREA BRITISH COLUMBIA FOR KELVIN ENERGY LIMITED CALGARY, ALBERTA

CLAIMS: SIM 1, SIM 2

LOCATION: Located on NTS Map 82E/15W and 82E/10 and is bounded by longitudes 118° 45' 30" W, 118° 48' 30"W and latitudes 49° 44' N, 49° 47'N in the Greenwood Mining District

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DECEMBER, 1978

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SUMMARY

Barringer Magenta conducted follow-up stream sediment and soil surveys in August and September, 1978 at Anomaly 3A discovered during a previous semi-detailed reconnaissance stream sediment program (Lahti, 1978). The follow-up work was done on the Sim 1 and Sim 2 claims staked by Kelvin Energy in June 1978 several kilometres south of Nevertouch Lake.

Fourty seven stream sediment, 255 soil and 14 rock chip samples were collected and analysed for uranium (fluorimetric), copper, lead, zinc, silver and nickel (atomic absorption). This area is readily accessible by truck or car.

To aid in interpretation, threshold values and anomalous levels were selected empirically from frequency histograms of the individual elements. Significant geochemical features were classified according to size, continuity, amplitude, geological and physiographic settings.

The stream sediment anomaly identified in three small streams could not be verified by the detailed soil sampling survey. The source of the stream sediment anomaly is probably due to weak uranium mineralization in the numerous shears and faults which are known to occur in the area. Soil sampling did not identify any significant uranium, copper, lead, silver or nickel anomalies. One slightly anomalous zinc feature was identified and judged not to be related to geology or mineralization but to some unknown glacial or environmental factors. The isolated uranium anomalies are closely associated with swampy ground high in organic matter.

It is recommended that several pits and trenches be excavated at the stream sediment uranium anomaly to examine the nature of the overburden and to determine if the source of the anomalous uranium concentration is related to a bedrock source such as a shear zone or fault.

1. INTRODUCTION

1.1 GENERAL STATEMENT

A stream sediment and soil sample follow-up survey was completed by Barringer Magenta Limited in August and September, 1978 on the Sim 1 and Sim 2 claims staked by Kelvin Energy Limited. The claims are located in the Greenwood Mining Division near Nevertouch Lake. The claim statistics are given in Table 1 below.

TABLE 1
CLAIM STATISTICS

Claim Name	Units	Tag No.	Date of Record	Record Number	Mining Division
Sim 1	20	31824	June 9/78	1106	Greenwood
Sim 2	20	31825	June 9/78	1107	Greenwood

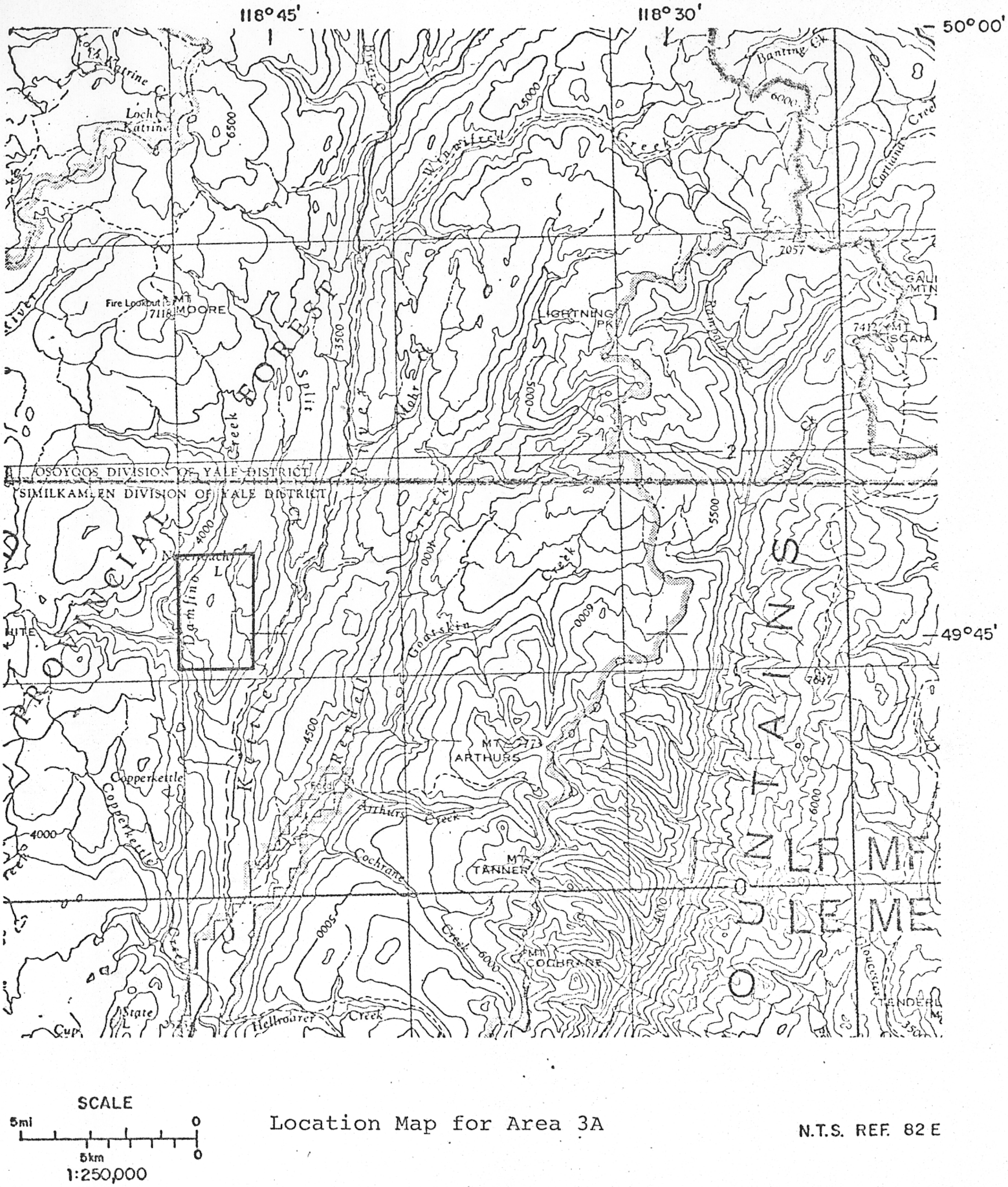
The follow-up work was done on anomaly 3A, a stream sediment anomaly identified during an earlier reconnaissance survey (Lahti, 1978). A total of 316 rock chip, soil and stream sediment samples were collected and analysed for uranium (fluorimetric), copper, lead, zinc, silver and nickel (atomic absorption).

The follow-up stream sediment survey confirmed the presence of a strong first order uranium anomaly. The soil sample survey did not identify the source of the uranium stream sediment anomaly.

1.2 LOCATION AND ACCESS

Anomaly 3A is located between the road to Nevertouch Lake and the Nevertouch Creek to the east (Fig. 1). The area is delimited by longitudes 118° 45' 30", 118° 48' 30" and latitudes 49° 44', 49° 47' and is located on NTS maps 82E/15W and 82E/10.

The general area can be reached by using the Christian Valley road from the north (Highway 6) or via the Christian Valley road from the south, i.e., Beaverdell or Rock Creek. Anomaly 3A can be reached by the access road to Nevertouch Lake which forks to the west from the Christian Valley road and extends along the north side of the Damfino Creek.



Location Map for Area 3A

N.T.S. REF. 82 E

2. GEOLOGY

The predominant rocks underlying the survey area are Proterozoic paragneiss (minor pegmatites) of the Monashee and Grand Forks Groups (Little, 1957). In the southern part of the soil grid Valhalla granite and a porphyritic granite intrusion outcrops. These later rocks are of an uncertain age but are believed to be Cretaceous. The Monashee-Grand Forks and Valhalla intrusions are identified on the uranium interpretation map by numbers 1 and 7, respectively.

Fourteen rock samples were collected to identify any variation in uranium and base metals in the bedrock and to detect any variation in uranium, copper, lead, zinc, silver and nickel between the Monashee-Grandforks paragneiss and the Valhalla granite intrusions. The geochemical data do not suggest any significant differences in element concentration between these two units (Table 2). The high nickel concentration in samples NLFR-135, 136 and 137 is unexplainable with the limited geochemical and geological information. These rock samples are also slightly enriched in silver and uranium with respect to the other rock samples. The location of the above samples is in the area of the stream sediment anomaly in stream 3 and possibly could be related to the source of the uranium.

The bedrock has a dominant east-west foliation and appears to be sheared and brecciated which may have allowed weak mineralizing fluids to penetrate the paragneiss and granite and deposit the uranium as a thin film. Spectrometer (Gad 6) gamma ray measurements about 1.5 kilometers south of the last soil traverse line indicated uranium enrichment along shears which supports the above hypothesis. Also the high uranium stream sediment results occur on, or very close to, the contrast between the Valhalla intrusive rocks and the Monashee-Grandforks paragneiss. Additional work would be necessary to establish whether there is any relation between the geological contact and uranium mineralization.

TABLE 2

ROCK CHIP DATA FOR ANOMALY 3A

Sample Number (NLFR)	Location	U	Cu	Pb	Zn	Ag	Ni	Rock Description
10	NLFS 543 Line 5	3.0	3	7	58	< .2	3	Sheared granite gneiss with biotite and hornblende (Valhalla Intrusions)
11	NLFS 561 Line 5	3.0	1	7	61	.2	3	Sheared granite gneiss with biotite and hornblende (Valhalla Intrusions)
12	NLFS 582 Line 5	5.2	1	8	20	< .2	3	Granite
13	NLFS 593 Line 1	2.4	2	7	20	.2	3	Layered granodioritic to granitic gneiss (Valhalla Intrusions)
14	NLFS 612 Line 1	1.2	3	10	62	.2	3	Granite gneiss (Monashee-Grand Forks)
15	NLFS 635 Line 1	3.8	5	7	48	.2	4	Biotite gneiss (Monashee-Grand Forks)
135	NLFS 1584 Line 4	6.0	6	11	69	.6	47	Granite gneiss (Valhalla Intrusions)
136	NLFS 1607 Line 4	29.0	5	12	44	.4	61	Granite gneiss fine grain with Albite (Valhalla Intrusions)
137	NLFS 1630 Line 4	3.8	5	12	115	.7	34	Biotite gneiss (Monashee-Grand Forks)
138	NLFS 1635 Line 3	4.4	11	8	62	.2	3	Porphyritic granite gneiss
139	NLFS 1656 Line 3	.4	2	8	35	.2	2	Granite gneiss (Monashee-Grand Forks)
140	NLFS 1692 Line 2	2.6	2	10	27	<.2	3	Layered biotite gneiss (Monashee-Grand Forks)
141	NLFS 1708 Line 2	2.4	6	8	50	.2	3	Layered biotite gneiss (Monashee-Grand Forks)
142	NLFS 1725 Line 2	1.0	2	7	25	.2	2	Layered biotite gneiss (Monashee-Grand Forks)

3. TOPOGRAPHY, CLIMATE, DRAINAGE, VEGETATION, SOIL

3.1 TOPOGRAPHY

Anomaly 3A is located on an approximate north-south ridge which has an elevation of 1371.60 metres at the highest point and about 1066.8 metres at the lowest point on the Damfino Creek. The mountain ridge is cut by numerous north-south faults and shears which have formed narrow steep-sided valleys. The Damfino Creek has cut a very steep walled gorge to the south of the area. The stream valley formed by Nevertouch Creek has not been cut down to the same extent as the Damfino Creek. In general, the area is very rugged with severe micro-topography.

3.2 CLIMATE

The climate is characterized by wet and cool summers with cold snowy winters. The snow can remain on the ground at the higher elevations until late May. Hail, snow and sleet can occur during any month but rarely occur in July and August. Occasionally for short periods in July and August, temperatures can exceed 30°C.

3.3 DRAINAGE

The two principle streams are the Damfino and Nevertouch Creeks which flow to the southeast and occur on the south and north side of the mountain ridge, respectively. The mountain ridge has fine small seasonal streams which flow into the Damfino or Nevertouch Creeks. These small streams have very steep gradients which result in most of the water suspended silt being flushed down into the principle creeks. At least 500 grams of streambed material were required to ensure sufficent -80 mesh fraction for analysis.

3.4 VEGETATION

Forest fires have almost destroyed the original forest and only isolated islands of unburnt forest remains. On the well drained soils, dense stands of young pine trees have formed while along the few streams and in some of the swampy areas, fir, hemlock, spruce and larch predominate.

3.5 SOIL

The soils generally have well developed horizons where the drainage is good. In some stream valleys and areas with impeded drainage the humic layer varies in thickness from 5-15 cm. and the B horizon is generally richer in clay minerals. These wet soils tend to have poorly developed A_2 (leached) and B horizons. Around the fringes of the ubiquitous outcrops, soils are thin and poorly developed. Soils when they occur on talus slopes usually form a thin humic layer with a leached zone over a rocky regolith.

4. GEOCHEMISTRY

4.1 GENERAL STATEMENT

The follow-up stream sediment sampling was undertaken in order to isolate a first order uranium anomaly discovered during an earlier reconnaissance stream sediment survey (Lahti, 1978). Soil traverses, totalling 10 kilometers, were placed to bracket the best stream sediment anomaly. Fourty seven, 255 and 14 stream sediments, soil and rock chip samples, respectively, were collected and analysed for uranium (fluorimetric), copper, lead, zinc, silver and nickel (atomic absorption). Details on the Field Methods and Analytical Techniques are found in Appendix III.

4.2 RESULTS

The stream sediment and soil results for uranium, copper, lead, zinc, silver and nickel are listed in Appendix IV.
The uranium data and stream sediment interpretation have been included together on the same map (Dwg. 208-42-602). The copper, lead, zinc, silver and nickel stream sediment results are plotted on the same map (Dwg. 208-42-603). The soil and rock chip results are plotted on two maps, one for uranium (Dwg. 208-42-602) and the other for copper, lead, zinc, silver and nickel (Dwg. 208-42-604). Sample numbers for stream sediments, soil and rocks are plotted on Dwg. 208-42-601.

Claim boundaries and names are found on all maps. The stream sediment uranium interpretation map has the geology indicated and on the stream raw data maps the un-named streams are numbered to assist in the discussion. Also, the regional sample numbers and location, with the element values, are given on the stream sediment maps. All maps are located in map pockets at the back of the report.

4.3 INTERPRETATION

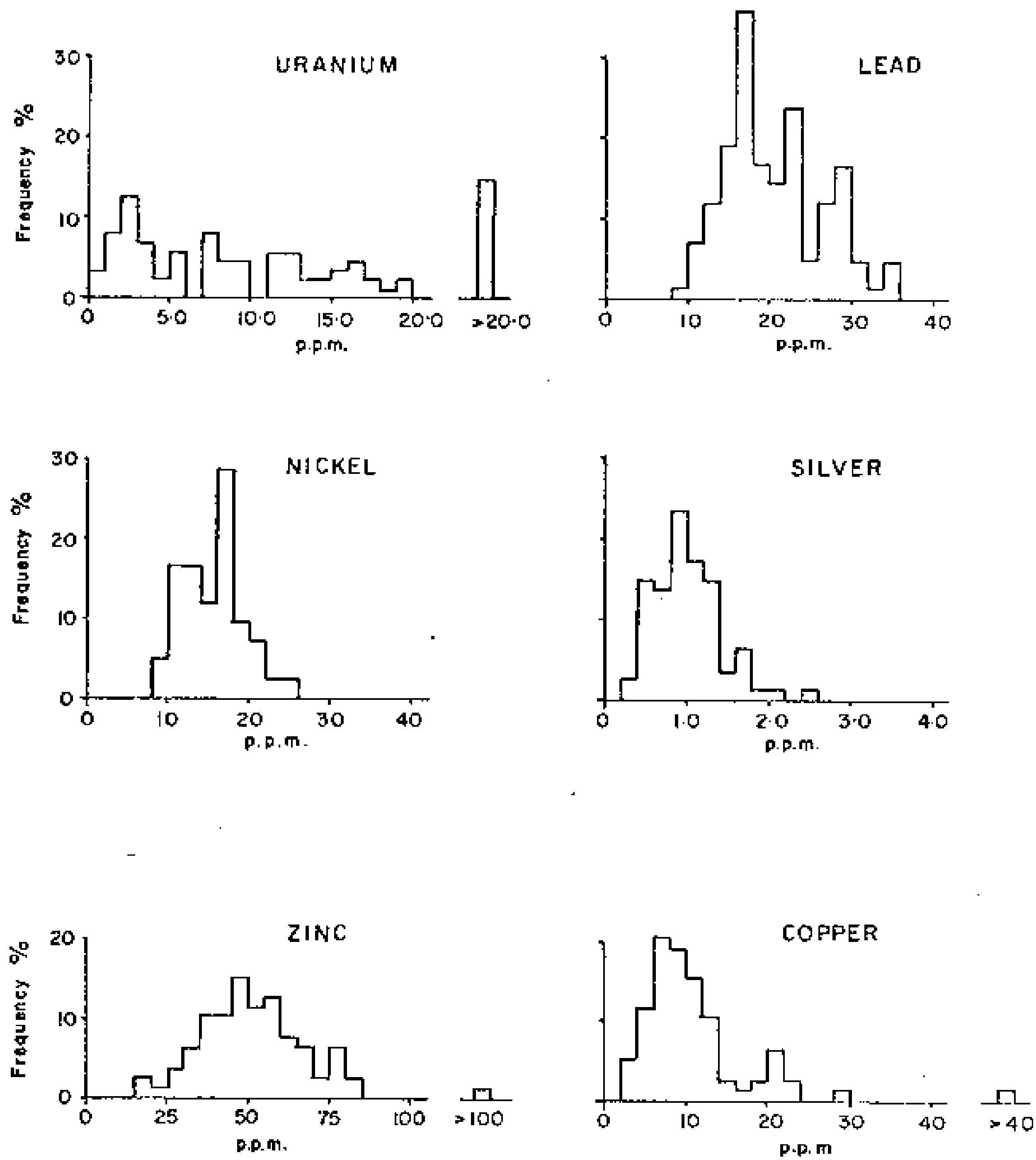
4.3.1 General Statement

To assist the interpretation, two sets of frequency histograms (Figs. 2 and 3) were used; one set is derived from the follow-up stream sediment sampling results and the other derived from the soil sampling results. The empirically derived thresholds and anomalous levels are listed in Table 3 and Table 4. Other information used for the interpretation include the raw data maps, geological information and field observations.

Uranium anomalies considered important are classified and identified on the stream sediment uranium raw data map by a number-letter code. The number indicates the priority for any future work and the letter is a measure of the importance of the anomaly with respect to amplitude, continuity of the geochemical pattern, the geology and environmental factors.

4.3.2 Uranium

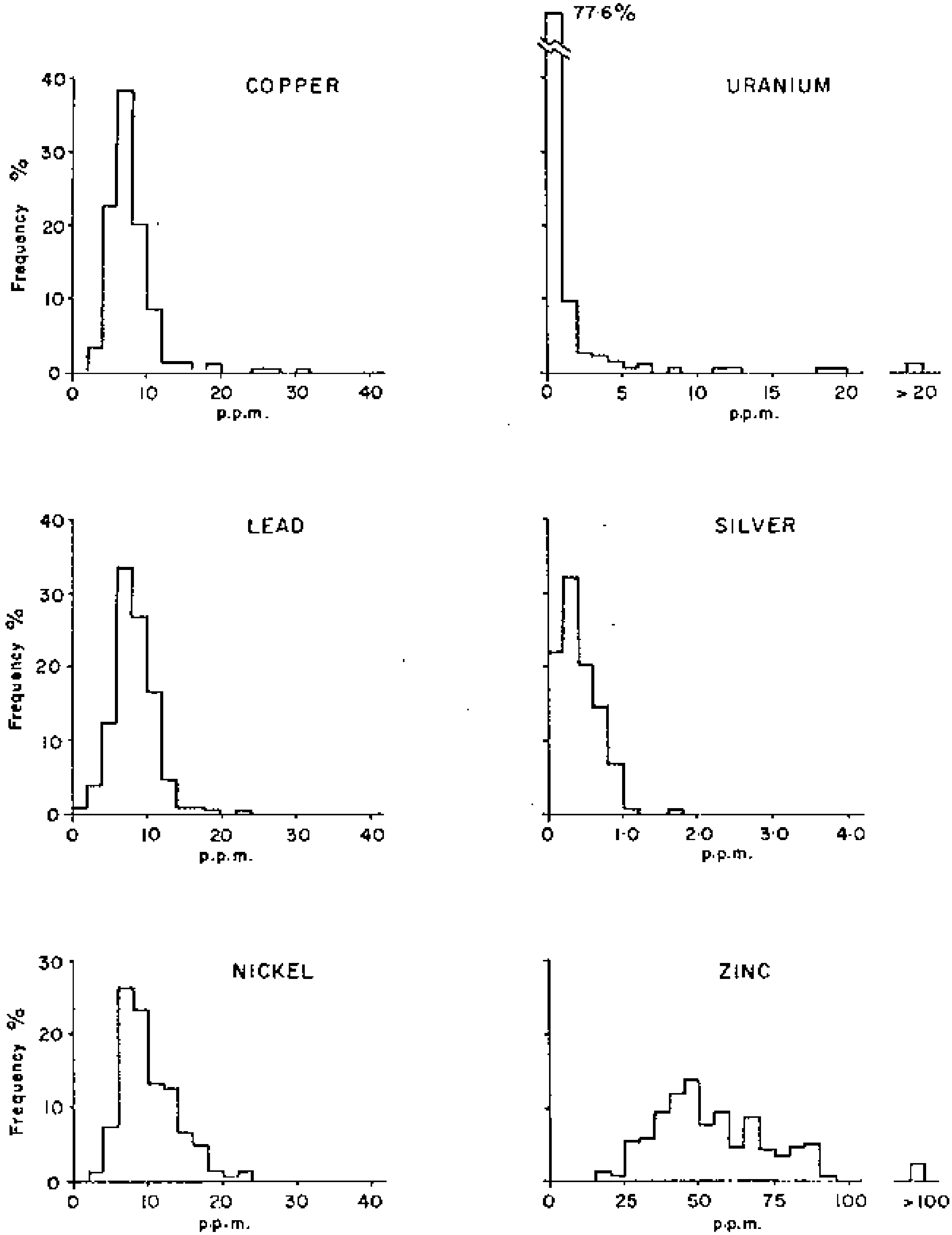
The stream sediment data identifies a strong uranium anomaly (1A) predominantly in the headwaters of stream 3 but also occurring in the right fork of stream 2 and near the origin of stream 4 (Dwg. 208-42-602). The uranium content in the sediments of streams 1 and 5 at the north and south end of the property, respectively, indicates the general area to have a high background in uranium. The highest value (106 ppm) is located in stream 4 approximately due east of the headwaters of stream 3. This sample is a soil sample taken from the gully extention of stream 4 and probably represents secondary accumulation of uranium in soil. These anomalous values trend approximately east-west concurrent with the regional foliation. However, strong northeast-southwest striking faults and shear zones also cut through the basement rocks and influence the drainage and possibly the distribution of the uranium.



FREQUENCY DISTRIBUTION OF URANIUM, LEAD, NICKEL, SILVER, ZINC AND COPPER IN STREAMS

ANOMALY 3A

FIG. 2



FREQUENCY DISTRIBUTION OF COPPER, URANIUM, LEAD, SILVER, NICKEL AND ZINC IN SOILS

ANOMALY 3A

FIG. 3

TABLE 3

THRESHOLDS AND ANOMALOUS LEVELS FOR U, Cu, Pb, Zn, Ag and Ni IN STREAM SAMPLES

Elements	Thresholds (ppm)	Fourth Order Anomalous (ppm)	Third Order Anomalous (ppm)	Second Order Anomalous (ppm)	First Order Anomalous (ppm)
Uranium	8.0		8.1 - 16.0	16.1- 32	> 32
Copper	16		17 - 24	25 - 32	
Lead	20	21 - 26	27 - 32	32 - 42	
Zinc	70		71 -105	105 -140	>140
Silver	1.4		1.5 - 3.0	3.1- 4.5	
Nickel	16		17 - 24	25 - 40	

TABLE 4

THRESHOLDS AND ANOMALOUS LEVELS FOR U, Cu, Pb, Zn, Ag and Ni IN SOIL SAMPLES

Elements	Thresholds (ppm)	Fourth Order Anomalous (ppm)	Third Order Anomalous (ppm)	Second Order Anomalous (ppm)	First Order Anomalous (ppm)
Uranium	2.0	2.1 - 6.0	6.1 - 12.0	12.1 - 18.0	> 18
Copper	16	---	17 - 24	25 - 32	> 32
Lead	20	---	21 - 30	---	
Zinc	65	---	66 -100	101 -150	>150
Silver	1.2	---	1.3 - 2.4		
Nickel	20	---	21 - 30	31 - 40	

The lack of a dispersion train below this very high uranium value suggests a very local source that can adequately be explained by the high uranium content of the bedrock. The concentration of uranium below NLF-16 remains between 7.6 - 18.0 ppm indicating a high uranium background in the bedrock or weak mineralization in shear zones, not likely to be associated with economic mineralization.

Although, in absolute terms, the anomalous uranium values in stream 3 do not approach that found in stream 4, the stream sediment anomaly does extend for 700 metres down from sample NLF-1095. The abrupt cut-off down stream at NLF-1087 is probably due to a sampling problem; samples above NLF-1087 are less than ideal stream sediment samples due to contamination by soil and only samples collected below 1088 are true stream sediments.

Stream 2 has a single first order anomalous concentration (56 ppm) of uranium near the headwaters, but there are no other supporting anomalous samples. The uranium content of the sediment decreases to 1.3 ppm 500 metres down stream suggesting the high uranium sample to be a local feature unlikely to be related to economic uranium mineralization. However, on inspection of the distribution of all anomalous stream sediment samples, it is apparent that the anomalous uranium values occur slightly below the 4200 foot contour and, as mentioned in a previous report (Lahti, 1978), several important uranium deposits have been discovered elsewhere near this elevation where they are protected from erosion by a cap rock. The uranium has a moderate and variable multi-element association in stream 2, 3 and 4. In streams 2 and 3, uranium has a good correlation with copper, lead and to a much lesser degree, silver and nickel. Anomalous zinc values are only coincident with uranium in stream 2. The association of uranium with second and third order anomalous base metal anomalies is not considered significant at this time.

The follow-up soil sampling does not identify the source for the stream sediment anomaly (Dwg. 208-42-602 and 604). The few first order and second order anomalies are scattered throughout the grid negating any contiguous geochemical pattern. The first order anomalous values; e.g., the 28 and 26 ppm values on Line 1, the 19.2 ppm value on Line 2, the 24.0 and 18.8 ppm values on Line 3 all are in low ground and in highly organic poorly drained soil. Caution must be exercised when eliminating the anomalies related to high organic matter because there are also samples with high organic carbon content but low uranium values. Although it is probable that these isolated low first order anomalies are related to secondary uranium derived from local high background sources in the bedrock, several anomalies should be examined depending on budget and time constraints. The uranium stream sediment anomalies appear most likely to be caused by weathering of uranium from weakly mineralized shears and fractures in the granitic county rock. The spacing of the soil sampling may have been too great to adequately detect very narrow sources or, especially if the shears are fairly open, the uranium might have been leached from the near surface parts of the fractures.

4.3.3 Copper, Lead, Zinc, Silver and Nickel

The second and third order anomalous base metal concentrations in the stream sediments suggest it is unlikely there is any significant mineralization (Dwg. 208-42-603) in this area. The association with uranium is discussed in Section 4.3.2 and is not considered worthy of any additional comment.

The soil sample data do not reveal any significant base metal or silver anomalies nor do they identify any noticeable trace element contrast between the Monashee-Grandforks rocks and the Valhalla intrusives. A low order zinc anomaly extends from

Line 2 to Line 5. The anomaly bifurcates at Line 3 into two narrower lenses, one which extends to the southwestern end of Line 2 and the other about 200 metres further to the northeast. The zinc anomaly cross-cuts the geology so does not appear to be related to a specific rock type. The large dimension of the anomaly and lack of first order anomalous values suggest the modest metal enrichment is due to some, as yet unidentified, glacial or environmental feature.

5. CONCLUSIONS

1. The stream sediment uranium anomaly identified in three small streams could not be verified by the detailed soil sampling program.
2. The distribution of the anomalous stream sediment samples suggest a hidden source probably related to weakly mineralized shears most probably above the headwaters of streams 2, 3 and 4.
3. In a regional context, all the streams draining the Anomaly 3A area have higher than average background values.
4. Soil sampling did not identify any significant uranium, copper, lead, silver or nickel anomalies. One weakly anomalous zinc feature was identified and judged not to be related to geology or mineralization but to some unknown glacial or environmental feature.
5. The isolated first order soil uranium anomalies are closely associated with swampy ground and high organic content in the soil so are not considered important at this time.

6. RECOMMENDATIONS

1. Several pits and trenches should be excavated near the headwaters of creeks 2 and 3 to examine the nature of the overburden and determine if it is residual or transported and to ascertain if the source of the uranium is related to a definable bedrock source such as a shear.

2. Detailed stream sediment sampling and detailed geological mapping should be undertaken to try and pinpoint the source of the uranium in streams 2, 3 and 4.

REFERENCES

1. Lahti, H.R. (1978): Report on the Semi-Detailed Reconnaissance Stream Sediment Survey, Kettle River area, British Columbia. Private report for Kelvin Energy Limited, Calgary, Alberta.

2. Little, H.W. (1957): Geology of Kettle River (East Half), Geological Survey of Canada, Map 6-1957.

APPENDIX I

STATEMENT OF QUALIFICATIONS

I, Howard Reino Lahti of Toronto, do certify that:

1. I graduated from the University of New Brunswick, Fredericton, New Brunswick in May, 1978 with a Doctor of Philosophy in Geology (Applied Geochemistry).

2. I graduated from the University of New Brunswick with a B.Sc. in Geology in 1968 and M.Sc. in Geology (Applied Geochemistry) 1971.

3. I have worked with Barringer Magenta Limited of Toronto, Ontario since June 1975 as a geologist/geochemist.

4. I have worked as a geologist, geochemist or attended university since 1964.

5. I am a Member of the Association of Exploration Geochemists.

Howard Lahti

H.R. Lahti, Ph.D.
Geologist-Geochemist
Barringer Magenta Limited

APPENDIX II

ASSESSMENT REPORT

Statement of Cost

a) Days Worked:

Supervisor, H. Lahti, August	5 days
September	2 days
Geochemical Technician, G. White, August	4 days
Senior Sampling Assistant,	
C. Shearer, August	5 days
Junior Sampling Assistant,	
K. Wisser, August	6 days
Junior Sampling Assistant,	
R. Balford, August	6 days
Junior Sampling Assistant	
D. Pyke, August	2 days
September	2 days
Junior Sampling Assistant,	
J. Baker, September	2 days
Prospector, C. Wainwright, September	2 days
Camp Guard, D. Moroko, August	1 day
Consultant, I. Thomson, August	2 days
September	2 days

b) Cost of Wages:

Supervisor, 7 days @ $220/day =	$ 1,540.00
Geochemical Technician, 4 days	
@ $119/day =	$ 476.00
Senior Sampling Assistant, 5 days	
@ $108/day =	$ 540.00
Junior Sampling Assistants, 16 days	
@ $96/day =	$ 1,536.00
Prospector, 2 days @ $50/day =	$ 100.00

b) Cost of Wages (Cont'd.)

Junior Sampling Assistant, 2 days @ $50/day =	$ 100.00
Camp Guard, 1 day @ $25 =	$ 25.00
Consultant, 4 days @ $300/day =	$ 1,200.00
	$ 5,517.00

c) Food and Accommodation

i) Field Camp: Charges -

$ 7.00 per person per day for food
$13.00 per person per day for rentals, etc.
$20.00

$20 x 29 crew days =	$ 580.00

ii) Eidelweiss Motor Hotel

4 persons x 2 nights x $33.83/day =	$ 270.64
	$ 850.64

d) Instrument Rental:

i) 2 Exploranium Model GR-101A	
August	$ 72.58
September	$ 300.01
	$ 372.59
ii) GAD-6 Spectrometer =	$ 281.95
iii) Radio Telephone =	$ 101.62
	$ 756.16

e) Geochemical Analysis:

i) Rock chip samples @ $8.90/sample for U, Cu, Pb, Zn, Ag, Mo or Ni 14 x $8.90 =	$ 124.60
ii) Stream sediment analysis @ $7.30/sample for U, Cu, Pb, Zn, Ag, Mo or Ni 47 x $7.30 =	$ 343.10
iii) Soil samples @ $7.30/sample for U, Cu, Pb, Zn, Ag, Mo or Ni 255 x $7.30 =	$ 1,861.50
	$ 2,329.20

f) Transportation:

i) Truck Rental =	$ 255.00
ii) Car Rental =	$ 30.60
iii) 3/4 ton Truck =	$ 31.94
iv) Helicopter Support =	$ 159.72
	$ 477.26

g) Cost of Report Preparation:

i) Drafting and Compilation

Compilation, P. Lawrence =	$ 297.92
Drafting, R. Marcroft =	$ 297.92
Data Graphics, M. Herz =	$ 300.00
Report Writing, H. Lahti =	$ 2,093.74
	$ 2,989.58

h) Miscellaneous: Sample shipment, telephone, cable, telex, xerox, = $ 866.34

TOTAL CHARGES $13,786.18

APPENDIX III

1.1 Stream Sediment Sampling

All follow-up stream sediment samples were collected by hand from several locations (within 20 metres) to make a composite sample.

About 500 grams of material per sample was placed in high wet-strength Kraft sample packets (6 cm. x 9 cm.). To mark the location of the sample site, a water proof pen was used to print the sample number on a one metre length of fluorescent orange flagging tape. Samples were collected every 100 metres with the distance estimated by pacing. Airphotos and topographic maps at a scale of 1:50,000 were used to assist in locating sample sites.

1.2 Soil Sampling

The soil sample was collected by using a grub-hoe. The soil sample was collected from the "B" horizon generally from a depth of ± 20 cm. Approximately 250-500 grams were placed in high wet-strength Kraft paper bags (6 cm. x 9 cm.). The sample traverses were placed 500 metres apart approximately perpendicular to the drainage and samples were taken every 40 metres. The traverses were surveyed by pace and compass using airphotos or topography maps at a scale of 1:50,000. The sample site was marked by a metre length of fluorescent orange flagging tape with the distance and/or sample number marked on with waterproof marking pen. The whole length of the traverse was blazed using orange flagging tape.

1.3 Rock Chip Sampling

In conjunction with the soil sampling, rock chip samples were occasionally taken along the soil traverses. The rock chip sample consists of 3 to 5 rock chips collected from an area of approximately 50 to 100 m^2. Approximately 250 grams of material was placed in high wet-strength Kraft paper packets (6 cm. x 9 cm.).

2. LABORATORY TECHNIQUES

Stream sediment analyses were done at the Barringer Magenta Limited laboratory, Rexdale, Ontario. The samples were first oven dried at a temperature of 45°C. The samples were then sieved through a 80 mesh nylon screen. A .500 gram portion of this was placed in a glass test tube and perchloric acid was added. The test tube was then placed in an aluminum heating jacket and heated for 4 hours. After cooling and diluting to the final volume, the solution then was directly aspirated into a Varian Techtron atomic absorption spectrophotometer and the concentrations of copper, lead, zinc, silver and molybdenum were read directly in ppm.

The uranium was determined fluorimetrically by using the following procedure. A .250 gram sample was weighed into a glass test tube and 5 ml. of nitric acid was added. The samples were digested on a sand bath for 2-1/2 hours. After cooling and diluting to the final volume an aliquot of solution was pipetted onto a platinum dish and evaporated to dryness. Flux was added to the dish and fused with the sample. After cooling, the disc was then compared with fresh standards using a Jarrell-Ash Fluorometer.

The limit of detection for copper, lead, zinc, silver, molybdenum and uranium are 1, 1, 1, .2, 1 and .2, respectively.

Rock chip samples were first put through a jaw crusher, pulverizer, and a -200 mesh nylon sieve. A .500 gram portion of the sample was then subjected to the same procedure used to analyse the stream sediment samples.

APPENDIX IV

ANALYTICAL DATA

Geochemical Laboratory Report

Sample Number	U ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Ag ppm
NLF- 1	12.0	12	33	63	19	1.0
2	7.6	8	36	64	16	1.0
3	12.4	11	30	52	14	.9
4	12.0	14	29	60	20	1.3
5	15.4	12	24	55	17	1.0
6	18.2	14	24	51	16	1.0
7	15.8	13	23	46	14	.8
8	15.8	14	26	54	18	.9
9	13.2	12	36	64	24	.8
10	15.4	12	22	54	17	.9
11	13.0	13	23	47	17	.8
12	14.4	13	21	49	17	.9
13	11.6	15	22	49	21	1.2
14	8.8	13	27	46	17	1.1
15	7.6	12	19	33	14	.8
16	106.0	10	9	6	4	.4
17	16.0	14	18	33	12	.7
18	8.4	9	17	38	12	.5
19	11.6	7	17	19	7	.4
20	3.0	7	14	38	14	.4

Geochemical Laboratory Report

SAMPLE NUMBER Soils	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
JLFS-534	9	8	89	.6	10	0.4				
535	11	8	69	.6	10	0.8				
536	10	8	81	.4	10	1.6				
537	8	9	89	.4	10	0.4				
538	8	9	89	.2	10	0.6				
539	7	7	75	.4	8	0.6				
540	7	8	83	.2	8	0.2				
541	9	7	90	<.2	7	0.4				
542	8	9	70	.2	8	0.6				
543	7	8	81	.4	9	1.0				
544	8	10	70	.2	9	0.6				
545	7	9	64	.2	8	0.8				
546	8	8	68	.2	8	0.6				
547	9	8	82	.4	8	0.4				
548	9	8	160	.4	10	0.2				
549	10	8	67	.4	12	0.6				
550	7	9	49	.2	9	0.4				
551	4	5	24	.2	3	1.2				
552	6	6	40	<.2	8	0.2				
553	7	7	50	<.2	7	0.2				
554	7	4	60	.4	12	0.4				
555	5	5	48	.2	7	0.8				
556	8	11	61	.4	8	1.2				
557	8	9	62	.4	10	0.6				
558	7	6	60	.4	13	0.4				
559	7	7	59	.4	11	0.4				
560	7	6	60	.2	11	0.8				

Geochemical Laboratory Report

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
NLFS-561	8	9	52	.4	11	0.6				
562	8	7	45	.4	9	0.6				
563	8	7	43	<.2	10	0.4				
564	10	8	49	.2	9	1.2				
565	10	7	60	.2	13	0.4				
566	7	6	40	.4	16	0.8				
567	7	6	50	.4	13	0.4				
568	7	7	52	.2	13	0.4				
569	9	7	49	.2	15	0.6				
570	7	6	49	.2	13	0.4				
571	15	9	45	.6	23	0.4				
572	8	7	42	.4	13	0.4				
573	5	7	27	<.2	11	0.2				
574	8	8	40	.4	16	0.8				
575	6	6	30	.2	11	0.6				
576	6	6	40	<.2	8	0.2				
577	7	7	45	.4	15	0.8				
578	5	5	35	.2	16	0.4				
579	4	5	27	.2	13	0.6				
580	5	3	40	.4	14	0.4				
581	10	8	40	.6	23	3.4				
582	9	6	33	.4	16	1.4				
583	7	6	35	.4	9	1.2				
584	4	4	30	<.2	8	1.0				
585	6	9	61	.4	8	0.4				
586	5	8	42	.4	8	0.2				
587	10	9	17	.2	3	0.4				

Geochemical Laboratory Report

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
NLFS-588	12	23	29	1.0	11	28.0				
589	6	9	26	.4	5	1.6				
590	4	8	23	.2	4	0.4				
591	10	9	50	.6	8	0.6				
592	6	9	45	.4	8	0.4				
593	20	8	16	.6	11	26.0				
594	11	11	35	.8	12	12.4				
595	7	9	40	.6	6	0.4				
596	7	8	35	.4	7	0.6				
597	6	9	29	.4	5	1.2				
598	6	9	35	.6	6	1.2				
599	10	9	35	.6	5	0.2				
600	8	8	41	.4	6	0.4				
601	13	11	48	.8	8	4.2				
602	7	8	38	.6	6	0.2				
603	5	4	34	.4	6	0.4				
604	9	10	33	.8	7	0.6				
605	8	6	35	.6	4	0.6				
606	12	12	34	.4	8	2.6				
607	8	10	57	.6	6	0.4				
608	17	13	72	1.0	19	11.6				
609	7	7	50	.4	7	0.8				
610	9	13	43	.6	9	1.6				
611	14	11	62	.8	14	8.4				
612	10	7	71	.6	8	1.0				
613	12	9	74	.6	10	0.8				
614	6	8	49	.4	6	1.0				

Geochemical Laboratory Report

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
NLFS-615	6	9	29	.4	5	1.4				
616	10	10	50	.6	10	1.0				
617	8	6	50	.6	8	0.2				
618	7	9	42	.4	8	0.4				
619	6	7	51	.8	11	0.4				
620	6	10	37	.6	6	0.2				
621	8	8	50	.8	17	0.6				
622	7	8	67	.8	17	0.4				
623	5	7	50	.6	19	0.2				
624	3	5	27	.2	8	0.2				
625	5	6	33	.4	13	0.6				
626	2	5	29	.4	8	0.2				
627	7	7	40	.4	15	0.4				
628	8	9	59	.4	21	0.4				
629	3	5	27	.2	6	0.2				
630	10	10	66	.6	18	0.6				
631	7	8	42	.4	13	0.6				
632	7	7	52	.4	18	0.4				
633	7	8	47	.4	14	0.6				
634	4	6	27	.4	9	0.6				
635	11	9	66	.8	18	0.6				

Geochemical Laboratory Report

Sample Number	U ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Ag ppm				
ELF- 1084	20.0	10	18	56	12	.8				
1085	14.4	9	18	51	12	.6				
1086	7.4	6	16	49	11	.6				
1087	12.8	8	19	69	12	.8				
1088	58.0	20	29	59	17	1.7				
1089	44.0	21	29	58	18	1.7				
1090	46.0	21	32	61	19	1.9				
1091	58.0	20	30	60	16	1.3				
1092	70.0	21	29	59	17	1.3				
1093	42.0	22	27	59	17	1.7				
1094	48.0	22	23	41	15	1.3				
1095	40.0	24	24	49	17	1.4				

Geochemical Laboratory Report

Sample Number	U ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Ag ppm				
NLF- 1110	.8	5	16	56	13	.4				
1111	1.1	9	21	74	14	.8				
1112	4.6	12	28	78	16	1.2				
1113	8.0	13	28	71	17	1.5				
1114	9.8	14	26	66	19	1.3				
1115	8.0	15	29	73	22	1.5				
1116	8.4	24	32	80	25	2.1				
1117	19.4	30	28	160	22	1.2				
1118	8.4	10	24	57	12	.9				
1119	4.6	7	17	48	10	.5				
1120	3.6	7	19	39	14	.6				
1121	1.6	6	16	41	11	.6				
1122	6.0	9	21	53	13	.6				
1123	1.3	6	11	29	10	.3				
1124	.8	6	14	37	11	.5				

Geochemical Laboratory Report

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm
NLFS-1581	4	7	46	1.0	8	0.4
1582	8	9	71	1.0	11	2.0
1583	8	8	62	0.8	11	1.2
1584	8	9	78	1.0	9	0.2
1585	10	11	90	1.2	10	1.4
1586	5	10	58	1.0	8	0.6
1587	10	13	130	1.0	10	0.4
1588	11	14	88	1.0	13	0.6
1589	7	11	70	0.8	10	11.2
1590	10	11	92	1.0	9	2.2
1591	11	11	76	0.6	9	0.4
1592	10	13	82	0.8	13	0.8
1593	7	8	50	0.6	10	0.8
1594	12	11	68	1.0	12	1.6
1595	5	7	45	0.6	7	4.0
1596	10	11	65	0.6	11	3.6
1597	10	9	82	0.6	9	6.2
1598	10	11	87	0.8	12	0.4
1599	11	13	88	1.0	14	0.8
1600	12	8	80	0.6	12	0.8
1601	9	8	60	0.8	12	0.6
1602	9	7	56	0.6	11	0.4
1603	9	9	67	0.8	14	0.6
1604	9	8	68	0.6	12	0.2
1605	10	9	53	0.8	10	3.8
1606	10	11	62	0.8	12	4.6
1607	7	11	52	0.6	10	5.2

Geochemical Laboratory Report

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm
NLFS-1608	11	11	76	1.0	11	1.6
1609	9	10	39	0.8	11	1.2
1610	9	8	44	0.8	16	0.6
1611	7	9	47	0.6	13	0.4
1612	9	10	77	1.0	18	0.8
1613	9	10	60	1.0	13	0.6
1614	9	8	41	0.8	13	0.6
1615	8	11	20	0.8	11	0.4
1616	6	9	37	0.2	11	0.2
1617	6	7	53	0.4	18	0.2
1618	32	9	52	0.8	35	5.2
1619	8	9	36	0.6	13	0.6
1620	10	9	46	0.8	18	0.4
1621	8	9	49	0.8	19	0.2
1622	5	9	47	0.6	16	0.2
1623	5	7	27	0.6	15	0.6
1624	5	10	60	0.6	9	0.2
1625	5	9	41	0.4	12	0.4
1626	10	12	60	1.0	18	0.2
1627	7	10	52	0.8	17	0.6
1628	7	9	52	0.8	24	0.2
1629	8	10	38	1.0	14	0.4
1630	6	7	45	0.6	13	0.4
1631	7	8	43	0.6	16	0.2

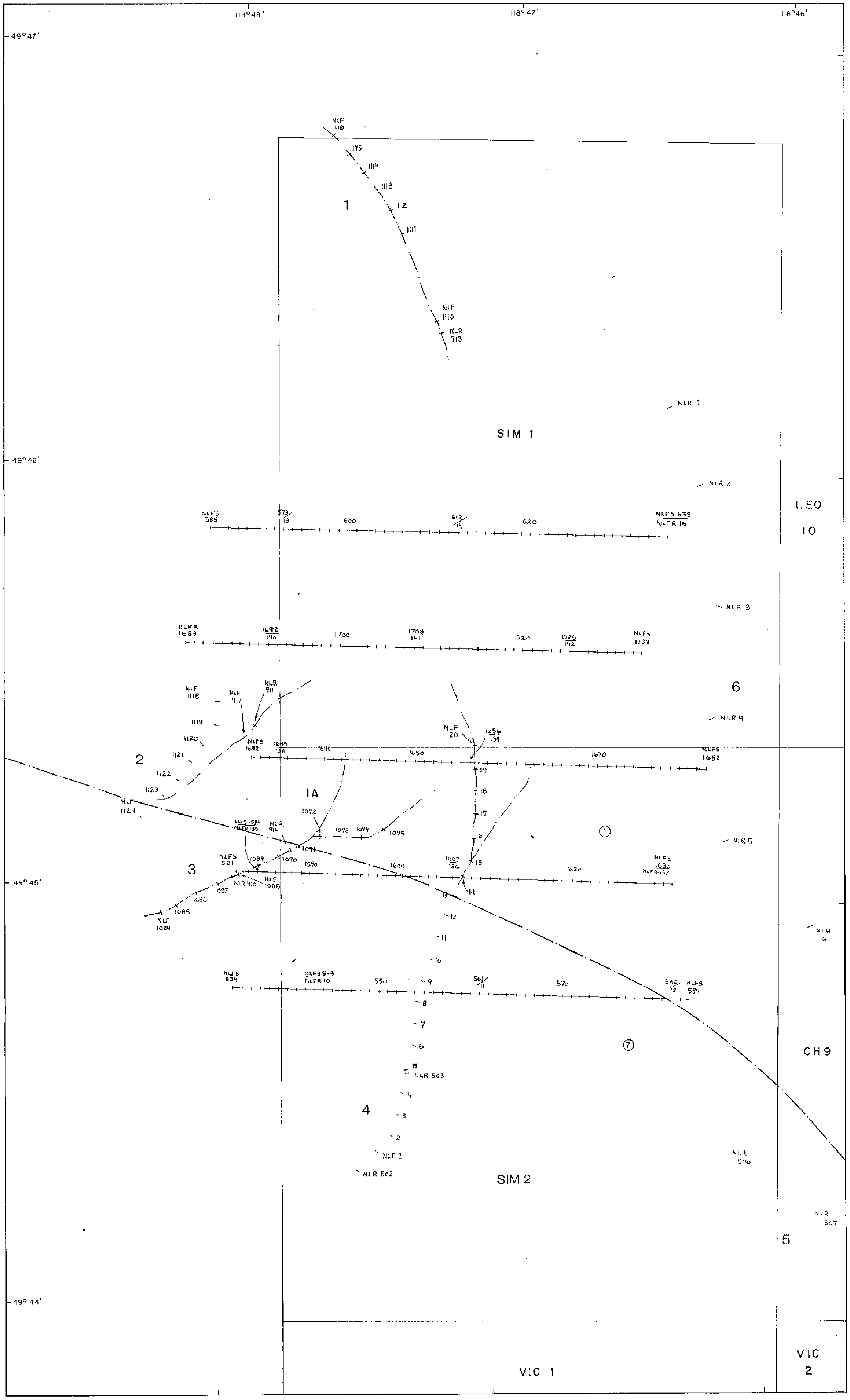
Geochemical Laboratory Report /

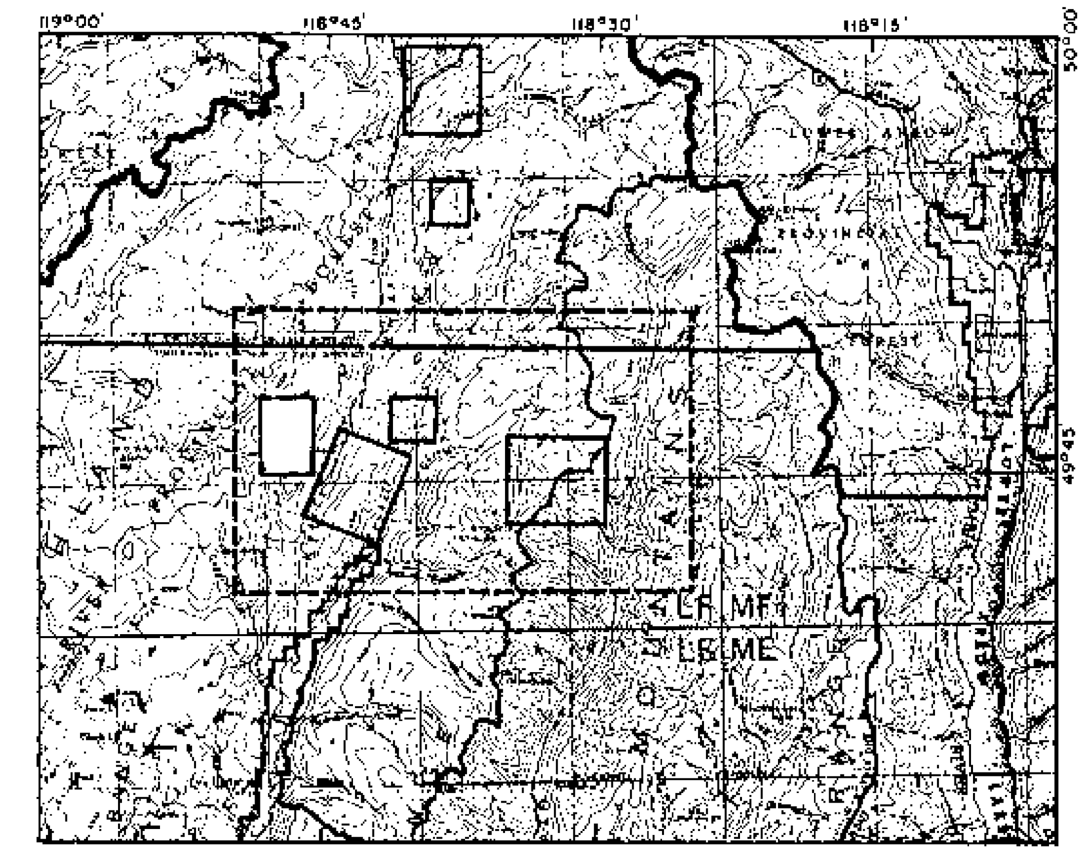
Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
NLFS-1632	10	9	67	.6	18	0.4				
1633	20	12	76	.8	15	8.2				
1634	10	7	120	.4	7	1.3				
1635	13	11	81	.6	9	3.0				
1636	12	9	51	.6	10	2.8				
1637	13	9	43	.6	8	1.4				
1638	10	9	67	<.2	8	0.6				
1639	8	8	69	<.2	8	0.4				
1640	6	8	52	.2	10	0.4				
1641	7	9	61	.2	8	0.8				
1642	19	15	71	.8	13	24.0				
1643	7	8	75	.2	8	0.6				
1644	7	8	70	.4	6	0.6				
1645	8	8	87	.4	5	0.4				
1646	6	8	54	.4	9	0.6				
1647	8	7	47	.4	9	6.2				
1648	7	7	40	.2	9	3.2				
1649	10	8	50	.4	10	4.8				
1650	7	7	50	<.2	10	0.6				
1651	9	8	55	.4	10	0.4				
1652	6	9	90	.2	8	0.6				
1653	8	8	47	.4	10	1.0				
1654	8	9	44	.2	10	0.6				
1655	9	7	50	<.2	10	0.4				
1656	8	8	45	.2	7	2.2				
1657	6	8	37	.2	8	0.6				

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
NLFS-1658	11	9	60	.2	13	1.0				
1659	11	9	51	.4	9	1.4				
1660	5	6	35	.2	8	0.2				
1661	8	7	36	.2	8	2.8				
1662	11	10	40	.4	12	4.4				
1663	5	6	38	<.2	8	0.4				
1664	5	5	44	.2	8	0.2				
1665	8	8	45	.4	11	0.6				
1666	7	10	44	.4	15	2.0				
1667	11	8	44	.4	12	3.0				
1668	27	8	30	1.0	15	18.8				
1669	6	6	69	.4	10	1.0				
1670	10	7	67	.6	15	0.6				
1671	9	8	57	.8	12	0.4				
1672	6	8	69	.6	10	0.2				
1673	7	8	72	.8	13	0.2				
1674	6	5	45	.6	13	0.2				
1675	5	4	45	.4	9	0.2				
1676	5	2	32	.2	13	0.2				
1677	7	4	43	.4	13	0.6				
1678	5	3	36	.4	12	0.4				
1679	5	4	55	.4	16	0.2				
1680	8	4	50	.4	13	0.4				
1681	5	4	35	.2	18	0.4				
1682	5	2	48	.4	14	0.2				
1683	8	7	70	.4	8	0.4				
1684	6	8	60	.4	7	0.4				

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm				
NLFS-1685	8	7	66	.4	10	1.0				
1686	7	8	82	.4	8	0.8				
1687	8	9	86	.6	10	0.4				
1688	8	11	88	.6	8	0.8				
1689	4	7	48	.2	6	0.2				
1690	6	11	56	.6	10	0.4				
1691	5	5	46	.4	8	0.4				
1692	9	14	56	.6	7	0.8				
1693	15	17	78	.8	12	12.2				
1694	6	12	49	.4	8	0.6				
1695	7	11	48	.6	5	0.4				
1696	8	11	57	.4	7	0.6				
1697	9	10	130	.8	7	0.8				
1698	15	12	60	.8	13	1.6				
1699	7	13	160	.6	10	0.2				
1700	9	12	81	.6	8	0.8				
1701	6	12	82	.6	8	0.6				
1702	8	12	75	.8	9	0.2				
1703	7	12	38	.8	7	1.0				
1704	10	12	86	.8	10	0.2				
1705	12	19	120	1.0	9	0.6				
1706	10	13	36	.6	6	1.2				
1707	7	10	58	.6	9	0.4				
1708	16	14	79	.8	14	1.4				
1709	9	12	67	.6	9	0.2				
1710	9	10	46	.4	9	0.2				
1711	11	15	83	.6	7	0.6				

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	U ppm
NLPS-1712	12	11	72	.6	10	0.4
1713	12	11	76	.6	10	0.4
1714	5	8	75	.4	8	<.2
1715	7	9	55	.6	8	1.0
1716	7	9	70	.8	8	<.2
1717	26	12	51	1.2	15	19.2
1718	7	8	59	.8	8	1.0
1719	8	10	58	.2	6	<.2
1720	9	17	55	.2	8	3.4
1721	7	13	63	.4	11	0.2
1722	7	8	58	.2	8	<.2
1723	9	12	81	.4	10	0.6
1724	7	11	43	.4	9	0.6
1725	6	9	43	.4	8	1.0
1726	7	11	44	.2	7	1.4
1727	10	11	53	.4	7	0.2
1728	11	13	63	.6	11	0.8
1729	7	9	46	.2	10	0.2
1730	6	11	40	.2	8	0.2
1731	11	12	77	.6	13	0.6
1732	8	11	62	.4	20	0.8
1733	10	11	50	.4	18	0.2





N

Surveyed and compiled by
BARRINGER MAGENTA LTD.
Toronto, Canada

LEGEND

SOIL — 18/12 — ROCK — Line or sampled stream with Sample number

SOIL — 17/25 — ROCK — element value in p.p.m.

JIM 8 — Claim boundary with name and number

5 — Stream number

3 — Inferred geological boundary and unit number (Little, H.W., 1957)

PART 4 OF 9

KELVIN ENERGY LIMITED
KETTLE RIVER AREA, B.C.

GEOCHEMICAL SURVEY

ANOMALY 3A
SOIL TRAVERSE FOLLOW-UP

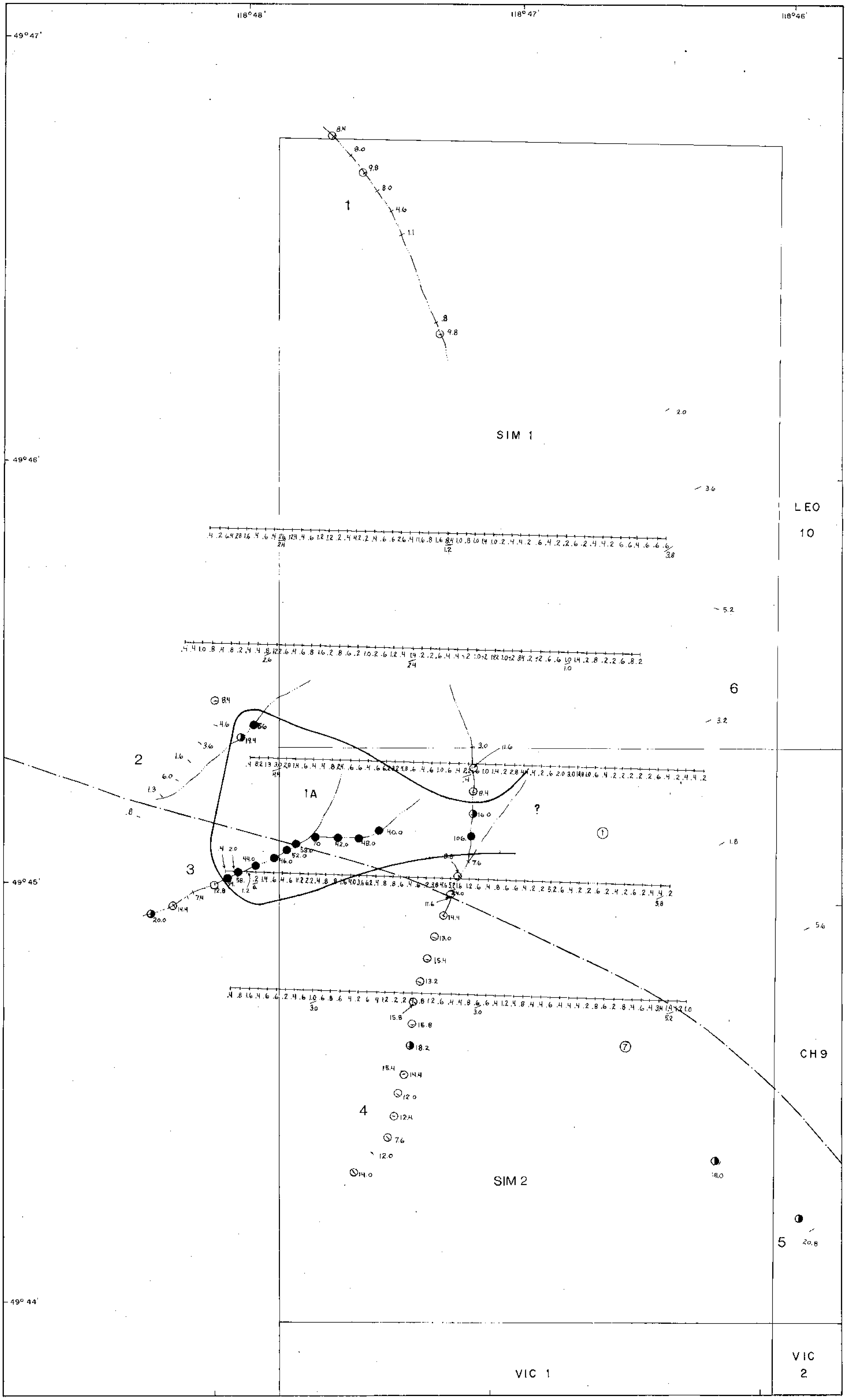
SAMPLE LOCATION AND NUMBER
(STREAM AND SOIL)

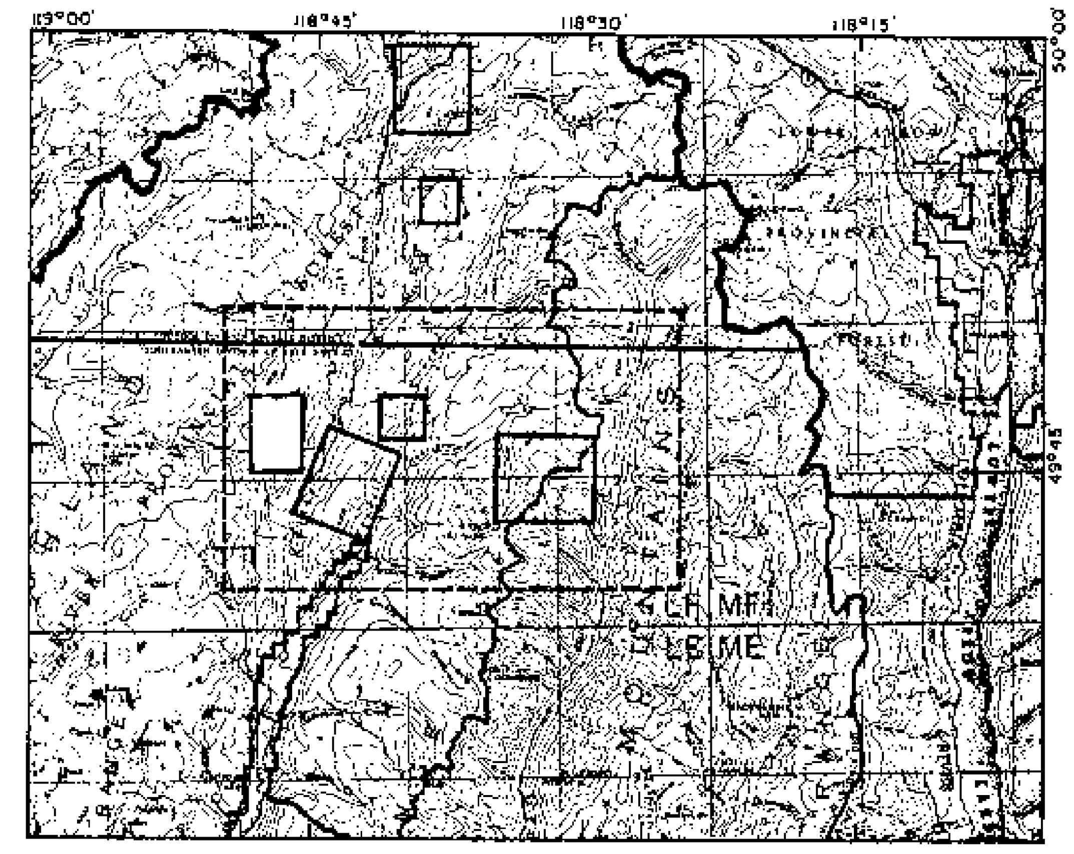
SCALE 1:10,000

FEET 0 1000 2000 3000
METRES 0 250 500 750 1000

AUGUST-SEPTEMBER 1978
N.T.S. REF. 82-E10,15

DRG 208-42-602





LOCATION MAP 1:500,000

N

A

Surveyed and compiled by
BARRINGER MAGENTA LTD.
Toronto, Canada

LEGEND

SOIL—ROCK — Line or sampled stream with Sample number
SOIL—ROCK — element value in p.p.m.

JIM 8 — Claim boundary with name and number

5 — Stream number

3 — Inferred geological boundary and unit number (Little, H.W., 1957)

1A — Strong anomaly with designation

Weak anomaly with designation

Stream sediment threshold 8·0 p.p.m.
3rd order anomalous 8·1 - 16·0 p.p.m.
2nd order anomalous 16·1 - 32·0 p.p.m.
1st order anomalous > 32·0 p.p.m.

PART 4 OF 9

MINERAL RESOURCES BRANCH ASSESSMENT REPORT
NO. 7160

KELVIN ENERGY LIMITED
KETTLE RIVER AREA, B.C.

GEOCHEMICAL SURVEY

ANOMALY 3A
SOIL TRAVERSE FOLLOW-UP

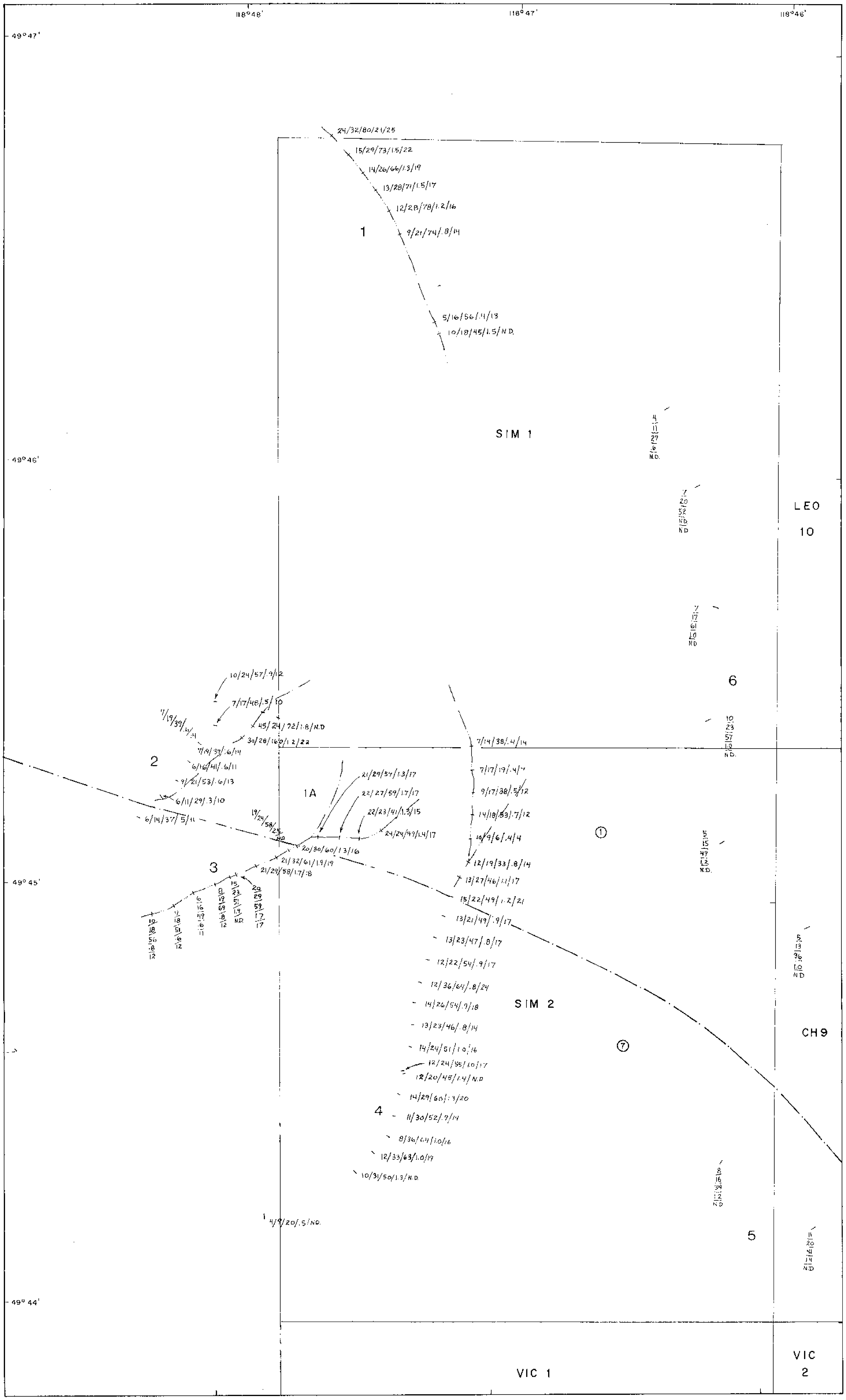
URANIUM DATA &
STREAM INTERPRETATION

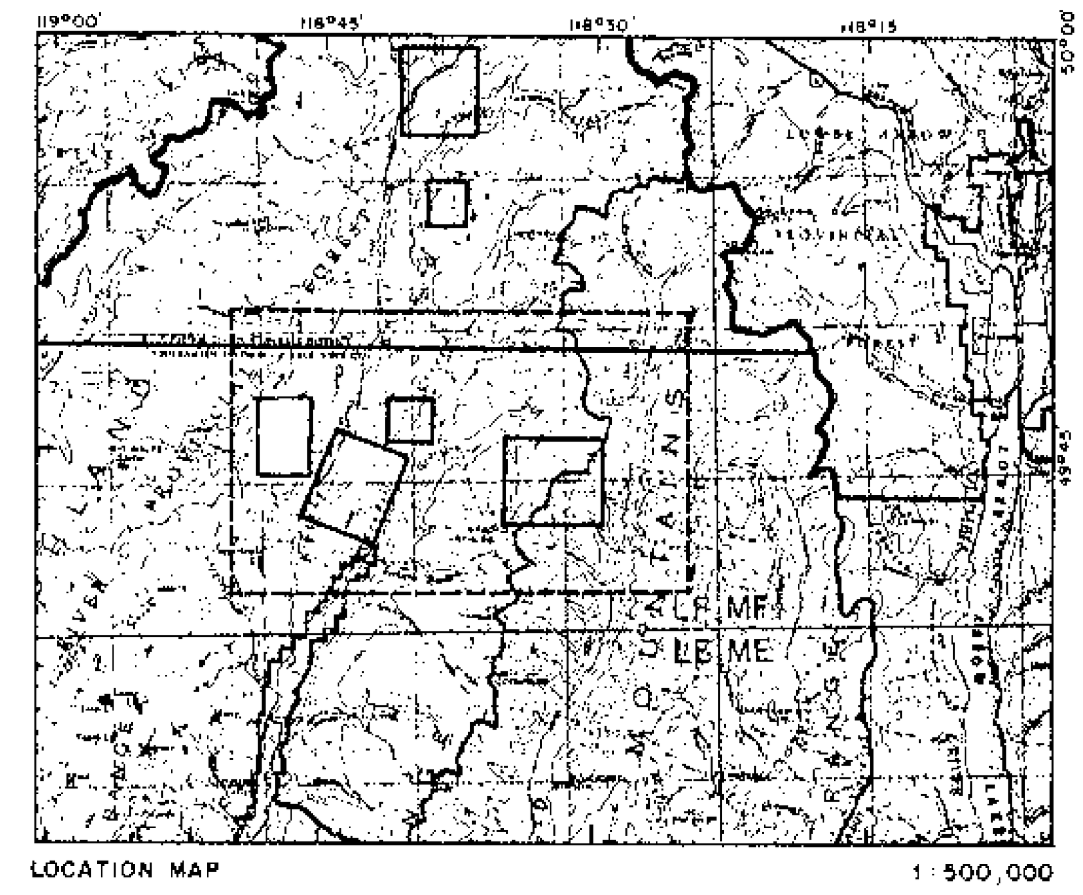
SCALE 1:10,000

FEET 0 1000 2000 3000
METRES 0 250 500 750 1000

AUGUST-SEPTEMBER 1978
N.T.S. REF. 82-E 10,15

DRG 208-42-602





Surveyed and compiled by
BARRINGER MAGENTA LTD.
Toronto, Canada

LEGEND

Line or sampled stream with
Sample number
element value in p.p.m.
Cu / Pb / Zn / Ag / Ni

JIM 8 — Claim boundary with name and number

5 — Stream number

3 — Inferred geological boundary and unit number (Little, H.W., 1957)

PART 4 OF 9

7160

KELVIN ENERGY LIMITED
KETTLE RIVER AREA, B.C.

GEOCHEMICAL SURVEY

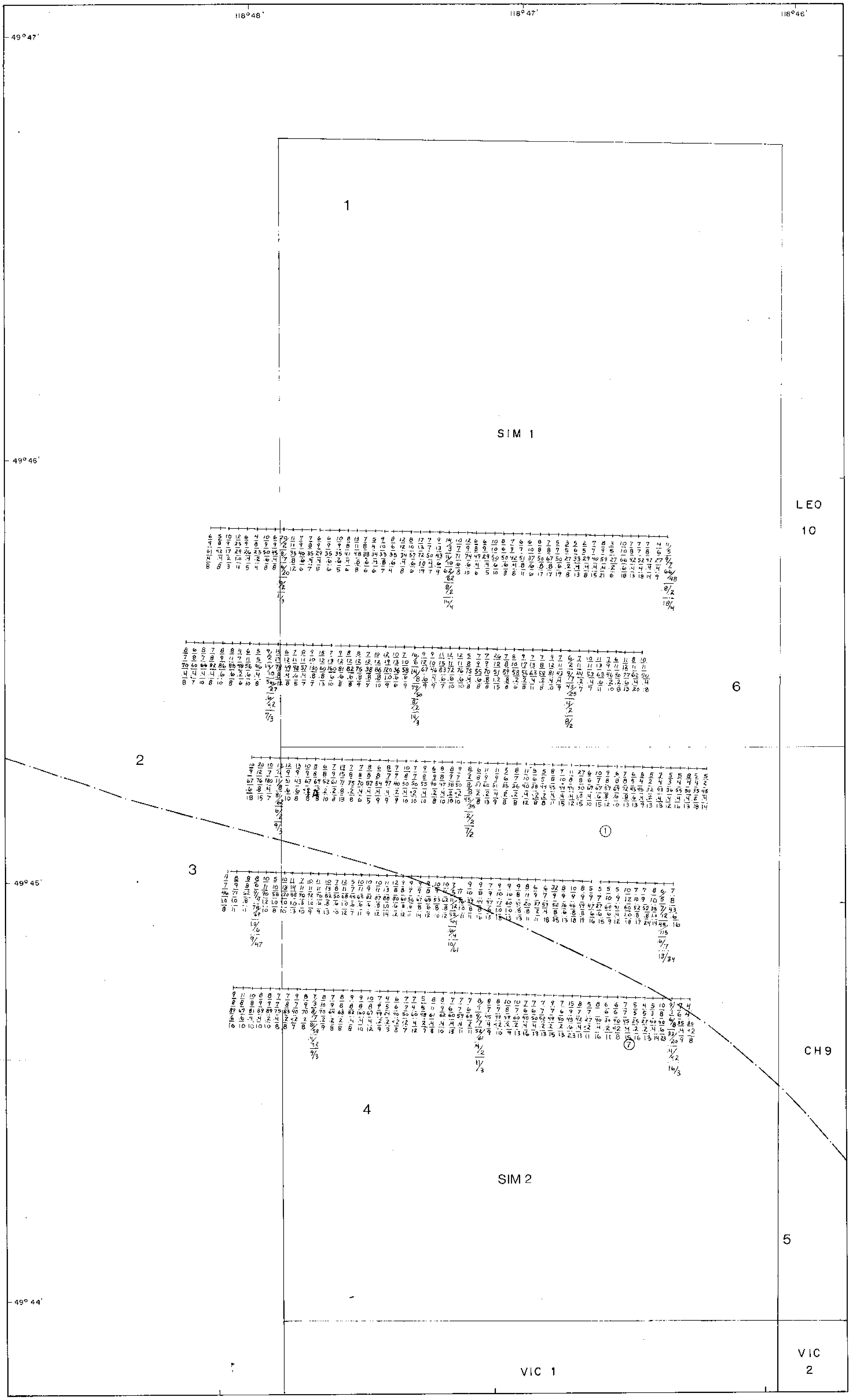
ANOMALY 3A
STREAM SEDIMENT FOLLOW-UP

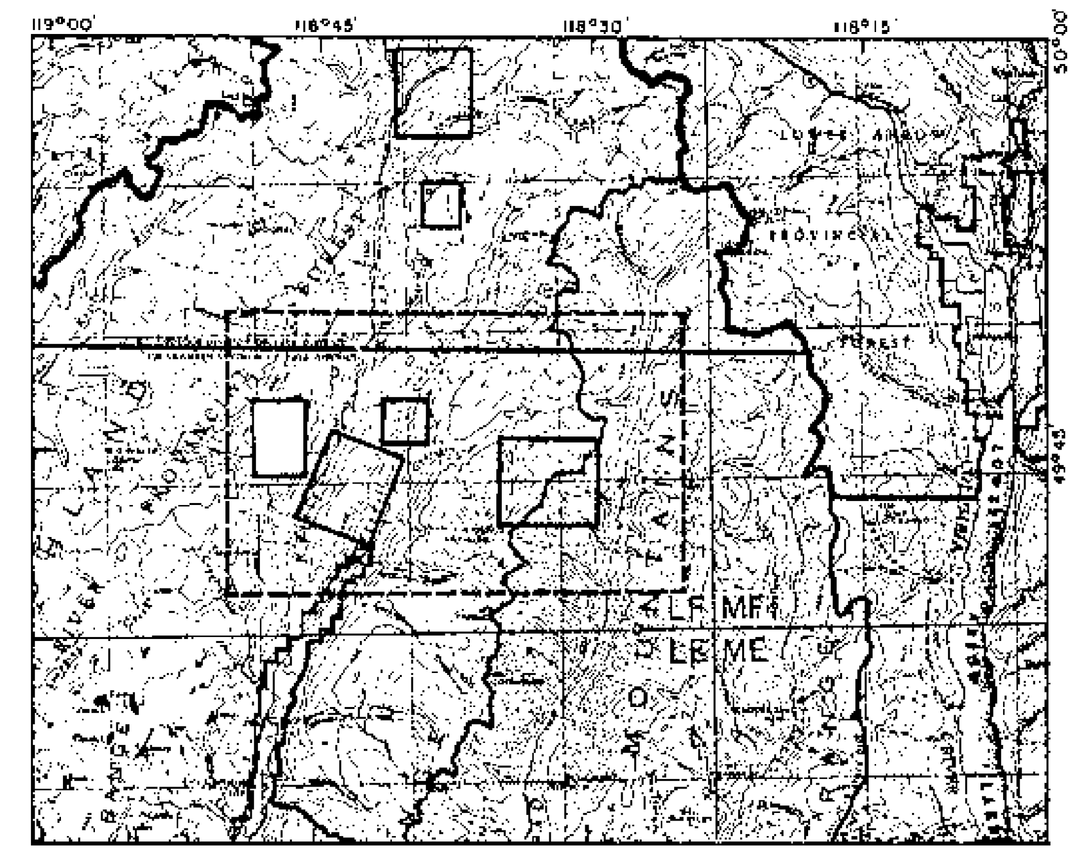
COPPER/LEAD/ZINC/SILVER/NICKEL

SCALE 1:10,000

FEET 0 1000 2000 3000
METRES 0 250 500 750 1000

AUGUST-SEPTEMBER 1978
N.T.S. REF. 82-E 10,15





LOCATION MAP 1:500,000

N

A

Surveyed and compiled by
BARRINGER MAGENTA LTD.
Toronto, Canada

LEGEND

SOIL - ROCK — Line or sampled stream with Sample number

SOIL - ROCK — element value in p.p.m. (Cu / Pb / Zn / Ag / Ni)

JIM 8 — Claim boundary with name and number

5 — Stream number

3 — Inferred geological boundary and unit number (Little, H.W., 1957)

PART 4 OF 9

7160

KELVIN ENERGY LIMITED
KETTLE RIVER AREA, B.C.

GEOCHEMICAL SURVEY

ANOMALY 3A
SOIL TRAVERSE FOLLOW-UP

COPPER/LEAD/ZINC/SILVER/NICKEL

SCALE 1:10,000

FEET: 0, 1000, 2000, 3000
METRES: 0, 250, 500, 750, 1000

AUGUST-SEPTEMBER 1978
N.T.S. REF. 82-E 10,15

DRG 208-42-604