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BIRCH INLET AREA - TASMANIA.

PROGRESS REPORT: EXPLORATION LICENCE 9/74

JOINT VENTURE

GEOPEKO LIMITED - UNION OIL DEVELOPMENT CORPORATION.

by

C.D. STRICKLAND

DEVONPORT, TASMANIA. JUNE 1978.

CONTENTS

	Page
List of figures.	5
List of maps.	6
Summary.	7
Introduction.	9
Conclusions.	10
Recommendations.	18

1. A.E.M. J.
2. A.E.M. B.
3. A.E.M. I and A.E.M. H.
4. Viking 1.
5. Viking 2.
6. A.E.M. E. and A.E.M. D.
7. Viking 19.
8. Viking 5.
9. Viking 3.
10. Viking 4.
11. Viking 20.
12. Viking 21.
13. Viking 6 and Viking 7.
14. Viking 10.
15. Viking 22.
16. Viking 11.
17. Viking 8.
18. Viking 9.
19. I.P. 22.
20. Viking 12 and Viking 13.
21. Viking 23.
22. Viking 14.
23. Viking 15.
24. Viking 16, Viking 17 and Viking 18.
25. Northern and Central Birch Inlet Areas.

Action Sheet.	
Previous work and mineral occurrences.	26
Location and access.	27
Physiography.	28
Vegetation and climate.	30

Page

Exploration programme - Phase 1. 32

Geology.

Regional setting and tectonic history. 37

Local geology. 39

Precambrian. 40

Undifferentiated quartzites and metasediments.

Cambrian. 40

Porphyritic quartz-feldspar rhyolitic lava.

Feldspar - quartz - biotite rhyolitic porphyry.

Vitric quartz - feldspar crystal tuff - lava.

Rhyolitic lithic pyroclastics.

Rhyolitic crystal pyroclastics.

Sandstones.

Conglomerate.

Sedimentary breccia.

Volcaniclastic sediments.

Ordovician. 51

Owen conglomerate.

Tertiary. 52

Macquarie Beds.

Quaternary. 52

Alluvial and colluvial deposits.

Geochemistry. 52

Drainage sampling.

C-horizon auger sampling.

Rock sample analysis.

Statistical treatment.

Geophysics. 57

V.L.F. Electromagnetics.

Magnetics. 58

Induced Polarization.

Discussion of Results. 58

1. A.E.M. J.
2. A.E.M. B.
3. A.E.M. I. and A.E.M. H.
4. Viking 1.
5. Viking 2.
6. A.E.M. E. and A.E.M. D.

Page

7. Viking 19.
8. Viking 5.
9. Viking 3.
10. Viking 4.
11. Viking 20.
12. Viking 21.
13. Viking 6 and Viking 7.
14. Viking 10.
15. Viking 22.
16. Viking 11.
17. Viking 8.
18. Viking 9.
19. I.P. 22.
20. Viking 12 and Viking 13.
21. Viking 23.
22. Viking 14.
23. Viking 15.
24. Viking 16, Viking 17 and Viking 18.

Bibliography. 71

Acknowledgements. 72

Appendices.

Appendix 1.	Drainage Geochemistry Results. (Cu, Pb, Zn, Ag, Mn, Fe.)	A1
Appendix 2.	Drainage Geochemisty Results. (Ba, Sn.)	A20
Appendix 3.	Drainage Geochemistry Results. Semi-Quantitative Emission Spectroscopy. (ESl-4 and ES6.)	A29
Appendix 4.	C-horizon Auger Geochemistry Results. (Cu, Pb, Zn, Ag, Mn, Fe.)	A34
Appendix 5.	C-horizon Auger Geochemistry Results. (Ba, Sn.)	A40
Appendix 6.	C-horizon Auger Geochemistry Results. Semi-Quantitative Emission Spectroscopy. (ESl-4 and ES6.)	A43

		Page
Appendix 7.	Rock Sample Geochemical Results. (Cu, Pb, Zn, Ag, Mn, Fe, Cd.)	A46
Appendix 8.	Rock Sample Geochemical Results. (As, Sn, Ba, Au.)	A48
Appendix 9.	Rock Sample Geochemical Results. Semi-Quantitative Emission Spectroscopy (ES1-4 and ES6.)	A49
Appendix 10.	Mineralogical Report No. 2228. I.R. Pontifex and Associates.	A50

LIST OF FIGURES

Fig No.	Title
1.	Location Map E.L. 9/74. Scale 1:500,000.
2.	Geochemical Orientation Programme: Cu, Pb and Zn Profiles. Scale 1:5,000.
3.	Cumulative frequency plots: Drainage Geochemistry - Cu, Pb and Zn - results Cambrian Volcanics, Birch Inlet.
4.	Prospect Location Map E.L. 9/74. Scale 1:100,000.

LIST OF MAPS

Exploration Licence 9/74, Birch Inlet, Tasmania. Scale 1:10,000. not with this report or on microfiche

- Geological Map:

  Sheets KT 9/74 1A - 4A.

- Drainage Geochemical Results: Copper, Lead and Zinc.

  Sheets KT 9/74 1B - 4B.

- Drainage Sample Location Map:

  Sheets KT 9/74 1C - 4C.

- Rock Sample Location Map:

  Sheets KT 9/74 1D - 4D.

- C - Horizon Geochemical Results: Copper, Lead and Zinc Profiles.

  Sheets KT 9/74 1E. (Scale 1:5,000).

- Geophysical Results: Magnetic, Ip and V.L.F. (E.M.) Profiles.

  Sheets KT 9/74 1F - 14F.

SUMMARY

Exploration Licence 9/74 is jointly held by Geopeko Limited and Union Oil Development Corporation. The area of 285 square kilometres contains an exposure of approximately 50 sq kilometres of Mt. Read Volcanics known locally as the Lucas Volcanics.

In the past this area had received only minimal attention of a reconnaissance nature. Detailed ground exploration involving the follow up of airborne geophysical techniques began as recently as 1973.

This report outlines the nature and results of Phase 1 of the exploration programme, which involved the following exploration techniques.

1. Regional:
   - Geological mapping at 1:10,000 scale.
   - 959 stream sediment samples for geochemical purposes from the 60 square kilometres of Lucas Volcanics.
   - 736 rock samples collected, sawn and examined for regional mapping purposes.
   - 40 rock samples petrographically examined for geological map compilation.
   - 82 rock samples geochemically analysed for regional backgrounds and trends.

2. Prospects:
   - 14,570 metres of gridding.
   - 308 C - horizon soil samples collected for geochemical purposes.
   - Ground geophysics involving magnetics, gradient array I.P. and V.L.F. (E.M.) techniques.

Phase 1 of the exploration programme has indicated that five prospect areas have initially been selected as favourable for massive sulphide mineralization of the Cu, Pb and Zn type.

- Viking 1 - Viking 2 area.
- Viking 19 - Viking 5 area.
- Viking 3 - Viking 4 area.
- Viking 10 area (Including Viking Nos. 6, 7, 8, 11, 21 & 22).
- Viking 23 - Viking 15 area.

Recommendations for Phase 2 of the onward exploration programme are given in this report.

INTRODUCTION

Exploration Licence 9/74 named 'Birch Inlet' occupies an area of 285 square kilometres in the Land District of Montgomery.

Exploration is carried out as a joint venture agreement between Union Oil Development Corporation and Geopeko Limited. Geopeko Limited has managed the Birch Inlet Project since the agreement was finalized in December 1976.

With the completion of a literature review and the preparation of 1: 10,000 scale base maps, a detailed exploration programme constituting the first phase of the Birch Inlet Project was drawn up in December 1976. Field parties entered E.L. 9/74 on the 15th January 1977 and commenced Phase 1.

This report reviews field exploration progress within E.L. 9/74 until 19th March 1977.

Phase 1 of the exploration programme consisted of:

(a) Base map preparation.

(b) Regional geological mapping at 1: 10,000 scale.

(c) Geochemical stream sediment sampling.

(d) Gridding of selected prospects.

(e) Orientation and C-horizon soil geochemistry of prospects.

(f) Ground geophysics of prospects, utilizing magnetic, I.P. and V.L.F. (E.M.) techniques.

(g) Reporting.

CONCLUSIONS

REGIONAL

1. Geological mapping, aided by the petrographic study of selected rocks, has shown that the Cambrian Lucas Volcanics within E.L. 9/74 are equivalents of the Mt. Read Volcanics and consist of:

   - Rhyolitic porphyritic lavas.
   - Rhyolitic porphyries.
   - Vitric quartz-feldspar tuff lavas.
   - Rhyolitic lithic and crystal tuff pyroclastics.
   - Volcaniclastic sediments.
   - Sedimentary units - sandstone, breccia and conglomerate.

2. The exploration approach selected for the Phase 1 programme during 1976/77 has shown that the zone of exposed Lucas Volcanics is prospective for massive sulphide Cu, Pb and Zn mineralization.

3. Geological mapping using surface outcrop has shown that the apparent structual trend of the rock lithologies is dominantly north-south. This direction parallels the faulted and folded unconformity with the Precambrian and the unconformity with the Odovician to the west.

   Structural trends within the rock units are largely dominated by an intense north-south cleavage pattern, however a steep westerly dip is interpreted for the Cambrian lithologies.

4. Detailed petrographic examination has indicated that in a gross sense the porphyry and porphyritic lava facies within E.L. 9/74 are predominantly rhyolitic compared with the generally rhyodacitic to dacitic character of the units within E.L. 10/74 (Geopeko-Union Oil).

5. Geological mapping has indicated a major trend in lithology from east-west, from a coarse grained rhyolitic feldspar-quartz-biotite porphyry in the east, interpreted as an extrusive or very high level intrusive, to a rhyolitic quartz-feldspar lava in the west. This major trend continues south of the Moores Valley graben into E.L. 27/76 (Geopeko Limited).

6. Geochemical drainage sampling, i.e. stream sediment analysis, appears to be a successful regional reconnaissance method for delineating zones anomalous in Cu, Pb or Zn. Within this environment of shallow weathering and high run off subtle anomalous responses are the norm.

Aided by a detailed statistical appraisal, eyeball techniques derived anomalous threshold values for the Cu, Pb and Zn results. Against a regional background of 2ppm Cu, 20ppm Pb and 25ppm Zn, results have been interpreted as anomalous when they have equalled or exceeded 10ppm, 70ppm and 160ppm Cu, Pb and Zn respectively.

7. Although the original rationale of selecting elements for analysis is considered sound, it is evident that certain elements have either no response in the area tested using stream sediment techniques or are not useful given the expense of analysis. These include Mn, Fe, Ag and Ba.

8. From the results of the orientation soil sampling programme, augering to 2 metres depth (or bedrock which ever was the lesser) was considered adequate for sampling the C-horizon within the Cambrian Lucas Volcanics.

Based upon a comparison of C-horizon Cu, Pb and Zn results with A1 horizon sampling (Union Oil Development Corporation) carried out on traverses 11200N, 14400N and 16000N, C-horizon geochemistry appears more definitive and shows an improved correlation between selected elements, particularly Fe and Mn.

9. An inadequate aeromagnetic contour map exists for the northern one third of E.L. 9/74. Deakin (1977) attempted to compile the contour data from the 1973 Scintrex Turair analogue flight tapes, however

due to the poor flight line positioning and recovery only 18 of the 46 flight lines could be used for the compilation.

Considering the significance of Viking 5 and 19 a recommendation for the reflying of this area with aeromagnetics is presented.

10. The central 24 square kilometre area of E.L. 9/74 between 5,274,000N (A.M.G.) and 5,280,000N (A.M.G.) was not covered by either the Scintrex (1973) or the Geoex (1975) airborne surveys.

Detailed reconnaissance geological mapping of this zone, especially in the vicinity of the Innes Peak campsite has shown a broad variety of potentially favourable host rocks including coarse rhyolitic lithic pyroclastics, sericitic porphyritic quartz-feldspar rhyolitic lavas and fine grained volcaniclastic sediments.

It is doubtful if exploration can effectively zero onto any anomalous area without the aid of magnetic and electromagnetic airborne techniques. A recommendation for the airborne coverage of this prospective zone with magnetic and electromagnetic systems is presented.

PROSPECTS

Phase 1 of the exploration programme has indicated that the following five prospect areas appear favourable for massive sulphide mineralization of the Cu, Pb and Zn type. These prospect areas are presented below in the order of their interpreted potential.

A. <u>Viking 10 Area</u> (Including Viking Nos. 6, 7, 8, 11, 21 and 22).

This 2.5 square kilometre area is considered favourable for significant Cu, Pb and Zn mineralization as it is associated with the following:

- favourable geological environment.
- highly anomalous stream sediment and C-horizon geochemistry values.
- a local abundance of inadequately explained airborne and ground geophysical anomalies.

1. Geological mapping has indicated a favourable geological environment in the Viking 10 area. The broad rhyolitic porphyritic quartz-feldspar lava unit, locally chloritized, sericitized and silicified is underlain ? by a unit of rhyolitic crystal pyroclastics and overlain ? by a fine grained volcaniclastic sandstone unit intercalated with shale horizons. A coarse lapilli - agglomeratic tuff is in close proximity to the southern portion of the Viking 10 grid.

2. Stream sediment samples from several of the creeks and streams draining the Viking 10 area are anomalous in Cu and Pb. Peak values recorded are 40ppm Cu, 100ppm Pb and 90ppm Zn. These values compare to a visually estimated background average distribution of 2 ppm Cu, 20ppm Pb and 25ppm Zn. The approximate areal extent of this anomalous drainage system is 0.25 square kilometres.

3. C-horizon soil geochemical results obtained from traverse 00E on the Viking 10 grid, indicate the presence of strongly anomalous Pb and Zn. Spot peak values are 1190ppm Pb and 870ppm Zn compared to a visually estimated background of 20ppm Pb and 30ppm Zn.

Significant C-horizon soil geochemical results were achieved approximately 700 metres north of Viking 22 during the auger drilling of traverse 16000N. Maximum peak values for Pb and Zn being 560ppm and 330ppm respectively.

4. The geophysical character of the Viking 10 area is significant. Viking 6 and 7 are Union Oil I.P. anomalies which showed a V.L.F. (E.M.) response on traverse 16000N between 1000W - 1500W. A.E.M. anomalies Viking 10, 11 and 21 have not adequately been tested geophysically, in fact the accurate locations for Viking 10 and 21 are questionable.

B. Viking 23 - Viking 15 Area.

This 1.5 square kilometre area is considered a favourable zone for significant Cu and Pb mineralization and is associated with the following:

- favourable geological environment.
- an abundance of highly anomalous stream sediment geochemical values.

1. Geological mapping has indicated a favourable geological environment in this area. The area is dominated by a massive rhyolitic porphyritic quartz-feldspar lava unit intercalated to the west by a rhyolitic lithic crystal tuff. The lava is in contact to the east with a distinctly sheared sericitized rhyolitic crystal lithic tuff.

2. Stream sediment geochemistry has shown that the creek systems draining a ridge within the porphyritic lava unit are highly anomalous in Cu, with associated anomalous Pb at one location. A total of 16 anomalous stream sediment samples are concentrated in this localized area. Peak values recorded are 15ppm Cu, 240ppm Pb and 90ppm Zn. These values compare to a visually estimated background average distribution of 2ppm Cu, 20ppm Pb and 25ppm Zn.

3. Soil geochemistry (A1 - horizon augering) carried out by Union Oil during 1974-75 on traverse 10400N and C-horizon geochemistry by Geopeko Limited on traverse 11200N confirm the northern extension of the Viking 23 drainage anomaly.

Peak spot C-horizon geochemical values from traverse 11200N as follows; 30ppm Cu, 860ppm Pb and 880ppm Zn.

4. Inconclusive V.L.F. (E.M.) follow up of Viking 15 (A.E.M. anomaly) situated 1 kilometre south of Viking 23 has shown a large, sharp in phase and quadrature anomaly.

C. Viking 19 - Viking 5 Area.

This area is considered favourable for massive sulphide mineralization as it is associated with the following:

- favourable geological environment.
- reported Australasian Minerals and Union Oil rock geochemical anomaly (Zn).
- anomalous stream sediment results.
- presence of a magnetic anomaly, Turair survey (1973).
- inconclusive V.L.F. (E.M.) anomalies.

1. Geological mapping using surface outcrop has indicated a unique variety of favourable potential host rocks in the environs of Viking 19 - Viking 5.

To the east is situated a coarse grained lapilli lithic crystal tuff containing extensive sericitic alteration of the volcanic rock fragments and minor associated hematite. Overlying ? this unit is a rhyolitic quartz feldspar porphyritic lava containing accessory fine grained hematite, intercalated with a chloritic, hematite veined sedimentary breccia horizon. To the west a fine to coarse grained sandstone horizon, interpreted as Cambrian, occurs also containing significant hematite.

2. Investigation of the Zn rock chip anomaly at Viking 5 by handauger methods resulted in discouraging values. Weakly anomalous Pb and Zn results, peak spot values of 160ppm Pb and 130ppm Zn, were recorded. The shallow depth of penetration of the handauger may be responsible for the low geochemical response encountered.

3. Stream sediment sampling resulted in two anomalous Pb values (maximum 70ppm) to the east of Viking 19, and a pair of anomalous Zn samples draining the Viking 5 ridge to the south west. The peak value for Zn was 140ppm.

4. The aeromagnetic data from the 1973 Turair survey shows a magnetic anomaly in close association with the Viking 19 - Viking 5 area, however ground magnetics over both prospect grids recorded flat profiles. Doubts as to the accuracy and thus usefulness of the existing airborne survey data are again raised.

5. V.L.F. (E.M.) data recorded over the Viking 19 grid traverse suggests two large conductors. Topographical effects on V.L.F. (E.M.)recordings are porportional to strata conductivity thus the relief in this area causes the existing V.L.F. (E.M.) data to be somewhat inconclusive.

D. Viking 1 - Viking 2.

This area is considered favourable for significant sulphide mineralization as it is associated with the following:

- favourable geological environment.
- faulting associated with hematite mineralization.
- proximity to a major time break: the Upper Cambrian unconformity.

1. Detailed geological mapping has indicated a favourable geological environment in the Viking 1 - Viking 2 area. The two A.E.M. anomalies are interpreted to lie within a unit of Cambrian sandstones situated below the unconformable contact with the Ordovician conglomerate to the west and the broad belt of rhyolitic porphyritic lava to the east which is intercalated with hematitic lithic tuffs and volcanicalstic sediment horizons.

A major north-south fault transects this area and in the Viking 2 region, is associated with quartz and specular hematite veins.

2. Reconnaissance stream sediment sampling, handauger soil augering and V.L.F. (E.M.) geophysics have been inconclusive.

E. Viking 3 - Viking 4 Area.

This prospect area, although incompletly studied during the reconnaissance programme is considered a favourable prospect for additional exploration.

- distinct Turair A.E.M. anomalies.

1. Geological mapping has defined this area as part of a broad belt of rhyolitic feldspar-quartz-biotite porphyry which is either an extrusive or a high level intrusive unit.

2. Scintrex (1973) and Deakin (1977) class these two A.E.M. anomalies as significant, however minor gridding and reconnaissance V.L.F. (E.M.) techniques are interpreted as having failed to locate the anomalies. Based on a lack of supporting evidence of potential mineralization from the geological and geochemical studies, the encouragement given by the airborne data is considered sufficient incentive for additional follow up in this region.

RECOMMENDATIONS

Phase 1 of the exploration programme of E.L. 9/74 successfully highlighted several prospects considered favourable for potential Cu, Pb and Zn mineralization.

Phase 2 of the exploration approach is aimed at a more detailed appraisal of selected anomalous areas involving prospect gridding, C-horizon geochemistry, geological mapping and ground geophysics.

It is recommended that Phase 2 of the exploration programme involve the following steps:

1. A.E.M. J.

   Located within the Ordovician and considered to have negative potential for additional study. No further work scheduled.

2. A.E.M. B.

   Use photogeological techniques to verify the location of this anomaly within the Ordovician.

3. A.E.M. I. and A.E.M. H.

   The anomalies are coincident with photolinears (faults?) within the Ordovician. No additional follow up is scheduled.

4. Viking 1.

   (1) Surveying of traverses at 200 metre intervals with pegs at 50 metre centres over the Viking 1 and Viking 2 prospect areas from the Viking 19/Viking 5 baseline. This will involve 6.1 line kilometres of gridding, the lines extending westwards to the Ordovician conglomerate.

   (2) Geological mapping and sampling to be carried out at 1:5,000 scale along all grid lines and supplemented by stream outcrop mapping where necessary. Mapping is to define the mode of occurrence of the hematite mineralization and areas requiring additional geophysics.

   (3) Handauger - Power auger soil sampling to be carried out on the grid traverses at 25 metre centres. The samples are to be taken from as deep as possible. A total of 270 samples including duplicates is anticipated. The geological logging of auger rock chip cuttings is essential. Samples are to be analysed for Cu, Pb, Zn, Ag, Mn, Fe, As, Ba and Sn.

(4) Dependant upon (2) above, a ground magnetometer survey is to be carried out on all grid traverses with a station spacing of 12.5 metres for a total 6.1 line kilometres.

(5) Dependant upon (2) above, ground electrical methods involving induced polarization, V.L.F. (E.M.) and also self potential, if applicable in this environment, are to be carried out on all grid traverses, a total of 6.1 line kilometres is involved.

L.A. Richardson and Associates to approve the final selection of geophysical methods and configurations.

5. Viking 2.

To be studied in conjunction with the Viking 1. programme outlined in 4 above.

6. A.E.M. E.
A.E.M. D.

Use photogeological techniques to verify the association of these two anomalies with the unconformable contact between the Lucas Volcanics and the Precambrian, or fault zones within the Precambrian. If these techniques are unsuccessful a brief geological reconnaissance will be necessary to establish the source of the anomaly.

7. Viking 19.

(1) Surveying of traverses at 200 metre intervals with pegs at 50 metre centres over Viking 19 and Viking 5. This will involve approximately 12.6 line kilometres of gridding dependant upon the location of the eastern contact of the Lucas Volcanics and the Precambrian.

(2) Hand auger - power auger soil sampling on the grid traverses at 25m centres. The samples to be taken from as deep as possible. A total of 490 samples including duplicates is anticipated. The samples should be analysed for the following elements. Cu, Pb, Zn, Ag, Mn, Fe, As, Ba and Sn.

(3) Geological mapping and sampling to be carried out at 1:5,000 scale on all grid lines and supplimented by stream outcrop mapping where necessary. Logging of auger rock chip cuttings is essential.

(4) Ground magnetometer survey on all grid traverses with a station spacing of 12.5 metres, a total of 11.2 line kilometres.

(5) Ground electrical methods involving induced polarization, V.L.F. (E.M.) and also self potential, if applicable in this environment, on all grid traverses, a total of 11.2 line kilometres is involved.

The final selection of geophysical methods and configurations will depend upon the results of the detailed geological mapping and consultations with L.A. Richardson and Associates.

8. Viking 5.

To be studied in conjunction with the Viking 19 programme outlined in 7 above.

9. Viking 3.

(1) Surveying of traverses at 200 metre intervals with pegs at 50 metre centres over the Viking 3 and Viking 4 prospects. A total of 4.6 line kilometres is involved.

(2) Detailed geological mapping and sampling to be carried out at 1:5,000 scale on all grid traverses together with follow up mapping within the drainage systems were necessary.

(3) Hand auger - Power auger soil sampling at 25 metre centres on all traverses, a total of approximately 176 samples including duplicates. The geological logging of auger rock chip cuttings is essential. All samples are to be analysed for the following elements: Cu, Pb, Zn, Ag, Mn, Fe, As, Ba and Sn.

(4) Geophysical location of the A.E.M. anomalies by an appropriate reconnaissance technique i.e. V.L.F. (E.M.), with possible follow up using ground electrical methods I.P., S.P., or T.E.M. on all grid traverses, a total of 4.0 line kilometres. L.A. Richardson and Associates to make the final selection of the geophysical methods suitable for this reconnaissance programme.

10. Viking 4.

To be studied in conjunction with the Viking 3 programme outlined in 9 above.

11. Viking 20.

(1) Dependant upon access, this A.E.M. anomaly requires reconnaissance geological investigation and rock sampling. The study is to be attempted during the geological mapping of the Viking 3 and Viking 4 grid programme.

(2) Fill-in stream sediment sampling to be carried out in several drainage systems to the east of the 1976/77 survey, a total of 12 samples including duplicates is anticipated. Samples are to be analysed for Cu, Pb, Zn, Ag, Mn, Fe, Ba, and Sn.

12. Viking 21.

To be studied as part of the Viking 10 programme outlined in 14 below.

13. Viking 6 and Viking 7.

To be studied in conjunction with the Viking 10 programme outlined in 14 below.

14. Viking 10.

(1) Surveying of traverses at 200 metre intervals with pegs at 50 metre centres over the Viking 10, Viking 11, Viking 22 and Viking 21 prospect areas. The existing U.O.D.C. traverse at 16,000N will be incorporated into the proposed grid, thus encompassing Viking 6, Viking 7 and Viking 8 within the Viking 10 study area. A total of 10.4 line kilometres of gridding is involved with the lines extending westwards to the Ordovician conglomerate.

(2) Geological mapping and sampling to be carried out at 1:5,000 scale on all grid lines and supplimented by stream outcrop mapping where necessary.

(3) Power auger soil sampling, with fill-in handauger methods in areas of difficult access, to be carried out at 25 metre centres on all grid traverses. Augering is to penetrate to a optimum of two metres or refusal, a total of 404 samples including duplicates is anticipated. The geological logging of auger rock chip cuttingsis essential. Samples are to be analysed for the following elements: Cu, Pb, Zn, Ag, Mn, Fe, Ba, As and Sn.

(4) A ground magnetometer survey is to be carried out using a 12.5 metre station spacing for a total of 9.2 line kilometres.

(5) Ground electrical methods involving induced polarization V.L.F. (E.M.) and also self potential, if applicable in this environment, are to be carried out on all grid traverses, a total of 9.2 line kilometres. L.A. Richardson and Associates to approve the final selection of geophysical methods and configurations.

15. Viking 22.

Refer to Viking 10, discussed in 14 above.

16. Viking 11.

Refer to Viking 10, discussed in 14 above.

17. Viking 8.

Refer to Viking 10, discussed in 14 above.

18. Viking 9.

This prospect has been adequately investigated during the 1976/77 field season. The source of the V.L.F. (E.M.) anomaly is considered to be the unconformable contact between the conglomeratic unit of the Lucas Volcanics and the Precambrian.

No additional follow up at Viking 9 is warranted at this stage.

19. I.P. 22.

The U.O.D.C. I.P. response in this locality, is considered on geological evidence, to be associated with the faulted contact between a unit of lithic tuffs and the Precambrian quartzites. Experience obtained from ground follow up at Viking 9 indicates that this prospect has little merit for additional exploration at this stage.

20. Viking 12 and Viking 13.

(1) Additional reconnaissance geological mapping and rock sampling within the drainage system is required. The source of the anomalies must be localized prior to any gridding and geophysical proposals within this area of rugged topography and dense vegetation.

21. Viking 23.

(1) Surveying of traverses at 400 metre intervals with pegs at 50 metre centres over the Viking 23 prospect. A total of 4.2 line kilometres of gridding is involved, however the prospect evaluation programme makes use of an additional 1.4 line kilometres of existing U.O.D.C. grid.

(2) Geological mapping and sampling to be carried out at 1:5,000 scale on all grid lines and supplemented by stream outcrop mapping where necessary.

(3) Handauger - Powerauger soil sampling on the grid traverses at 25 metre centres from as deep as possible. A total of 230 samples including duplicates is anticipated. The geological logging of auger rock chip cuttings is essential. All samples to be analysed for Cu, Pb, Zn, Ag, Mn, Fe, As, Ba and Sn.

(4) Ground magnetometer survey on all grid traverses with a station spacing of 12.5 metres, a total of 4.1 line kilometres is involved.

(5) Ground electrical geophysical methods involving induced polorization,V.L.F. (E.M.) and also self potential, if applicable in this environment, on all grid traverses, a total of 4.1 line kilometres is involved.

The final selection of geophysical methods and configurations will depend upon the results of the detailed geological mapping, soil sampling survey and consultations with L.A. Richardson and Associates.

22. Viking 14.

This A.E.M. has been adequately investigated during the 1976/77 field season. No additional follow up exploration is warranted at this stage.

23. Viking 15.

(1) Surveying of a single 900 metre traverse pegged at 50 metre intervals across the Viking 15 A.E.M. anomaly.

(2) Geological mapping and sampling at 1:5,000 scale, supplemented by stream outcrop mapping where necessary.

ACTION SHEET

1. Based upon the results of an in depth cost and system effectivness analysis, L.A. Richardson and Associates recommended that the proposed airborne electromagnetic and magnetic survey of portions of E.L. 9/74 be postponed. Airborne geophysics will await the availability of a suitable airborne E.M. system in Australia.

(3) Handauger - Power auger soil sampling to refusal at 25 metre centres along the grid traverse, a total of 40 samples including duplicates. This geochemical sampling will also define the southern boundary of the Viking 23 prospect. Geological logging of rock chip cuttings is essential. All samples to be analysed for Cu, Pb, Zn, Ag, Mn, Fe, As, Ba and Sn.

(4) Ground magnetometer survey to be carried out over the grid traverse at a station spacing of 12.5 metres.

(5) Ground electrical methods involving induced polarization and also self potential, iff applicable in this environment, to be carried out as a follow up of the significant V.L.F. (E.M.) response during the 1976/77 field programme.

L.A. Richardson and Associates to approve the final selection of geophysical methods and configurations.

24. Viking 16, Viking 17 and Viking 18.

From geological evidence these prospects lie within the Precambrian and thus have little potential for massive sulphide type mineralization. Although these prospects are not considered significant enough to warrant further study at this stage, the possibility of strataform Cu - U deposits within the Precambrian should be examined.

25. Northern and Central Birch Inlet Areas.

(1) Undertake an airborne Electromagnetic and aeromagnetic survey of the central Birch Inlet Area from 5,274,000N A.M.G. to 5,280,000N A.M.G. This 24 square kilometre area has not been covered by either the 1973 Scintrex Turair survey or the 1975 Geoex survey.

(2) During the airborne survey of (1) above, refly the northern Birch Inlet area with aeromagnetics. Serious doubts exist concerning the accuracy of the 1973 Turair survey and significant magnetic character exists within this region to warrant a precission survey. Approximately 17 square kilometres of reflying is involved.

Summary:

The above recommendations involve a detailed study of five separate areas within E.L. 9/74.

- Viking 1 - 2.
- Viking 19 - 5.
- Viking 3 - 4.
- Viking 10.
- Viking 23.

An intensive geological, geochemical and geophysical assessment of these prospect areas up to the stage of diamond drill testing is estimated to encompass two field seasons, during which time additional reconnaissance exploration of incompletly examined anomalies will be undertaken.

It is recommended that the proposed airborne survey be completed prior to the commencement of the Phase 2 field programme to enable an early assessment of the processed data and possible modifications to the work priorities.

PREVIOUS WORK AND MINERAL OCCURRENCES.

Broad reconnaissance exploration was carried out in this area by the Mt. Lyell - Electrolytic Zinc partnership during the late 1950's.

Airborne magnetics, electromagnetics and radiometrics were flown by L.E.E. and ground follow up included regional stream sediment sampling.

The Broken Hill Proprietory Co. Limited held the Birch Inlet area as part of E.L. 13/65 (6000 sq miles) during late 1960's, exploration within this extensive area was concentrated however along the coastal fringe from Cape Sorell to Port Davey.

Australasian Minerals Inc. (1972-1974) was the first company to do any detailed field exploration in this area. During February 1973 Australasian Minerals contracted Scintrex to carry out a Turair E.M. and magnetic survey over the northern one third of E.L. 2/72. This part of south west Tasmania is a difficult area to undertake airborne geophysical work. Although this survey was helicopter borne, the rugged terrain and hazardous flying conditions appeared to have strained the limit of accuracy of the operation. Australasian Minerals completed a series of widely spaced soil sample traverses in conjunction with geological mapping and rock chip sampling. Australasian Minerals concluded that no significant mineralized zone outcropped, and discontinued work on E.L. 2/72 in 1974. They felt that 'the airborne geophysics had probably located massive sulphides at depth' in one area but no further work was warranted as the data suggested that the widths were narrow.

The Union Oil Development Corporation pegged E.L. 9/74 in May 1974 and carried out field work from mid - February to mid - April 1975. Extensive gridding, ground geophysics, stream sediment sampling soil augering and rock geochemistry were completed for the purposes of a volcanogenic copper-lead-zinc search over the Lucas volcanics.

The southern one third of E.L. 9/74 was flown by Geoex during April 1975. A total of 120 line kilometres was flown using the 'H 400' helicopter E.M. and magnetometer system.

Twenty one line kilometres of gradient array induced polarization was completed between 12800N and 19200N at 800m intervals by Union Oil.

Union Oil considered seven areas that warranted further exploration and Geopeko Limited incorporated these recommendations within Phase 1 of their exploration programme.

LOCATION AND ACCESS

Exploration Licence 9/74 is situated within a zone of Cambrian acid volcanic and volcanosedimentary rocks known locally as the Lucas Volcanics. These rocks are exposed over approximately 50 square kilometres and are part of the extensive Mt. Read volcanic belt, which to the north contains the Que River, Rosebery, Hercules and Mt. Lyell ore deposits.

The northern boundary of Exploration Licence 9/74 is 50 kilometres due south along strike from the Mt. Lyell copper deposits.

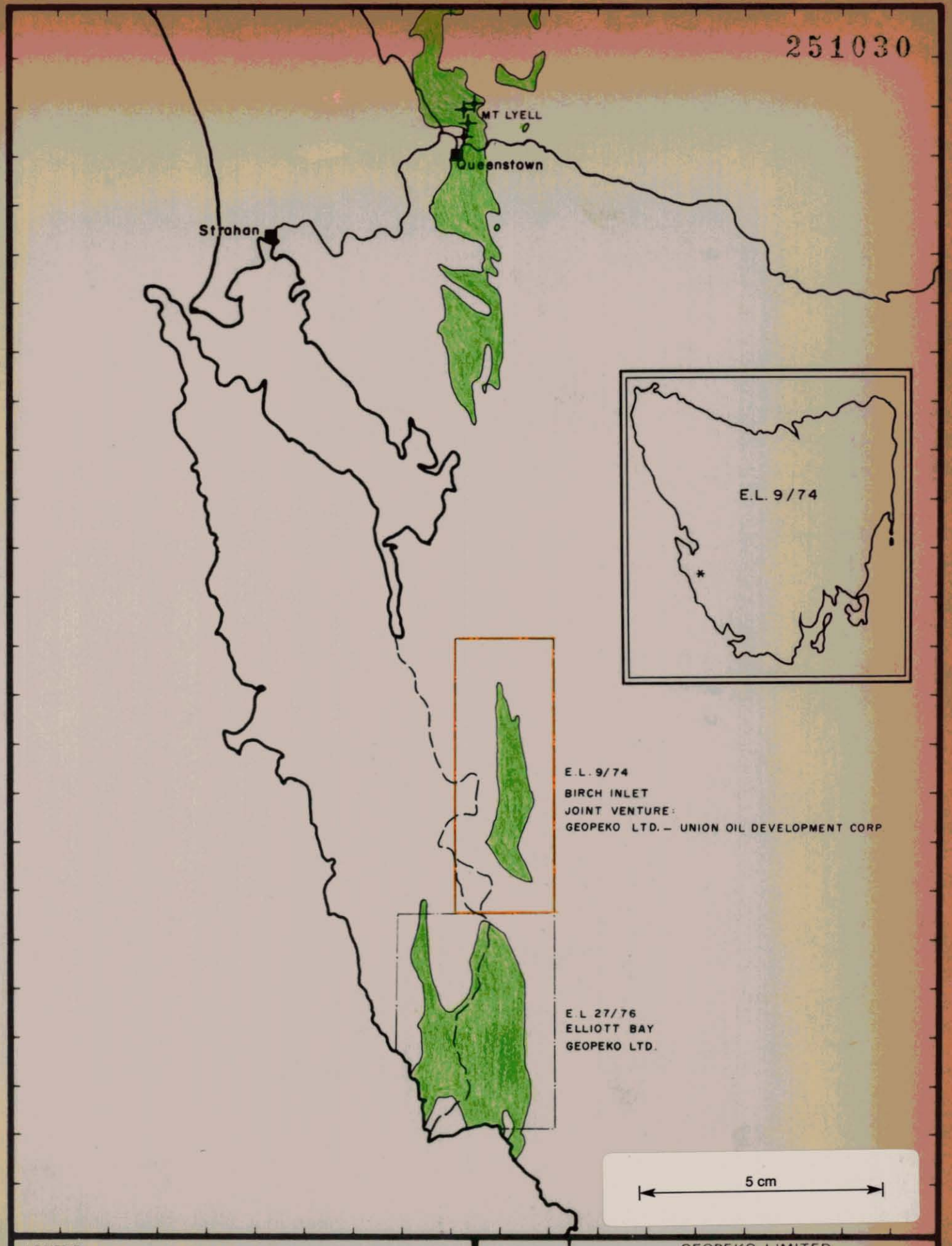
Access to this area is generally quite difficult and during bad weather it is totally inaccessible. The area can be reached from Strahan by launch to the head of Birch Inlet a distance of 50 kilometres. A further 2 kilometres up the Sorell River is situated a rough wooden landing known as the Bombardier Landing. Heavy equipment, namely bulldozers, can only be off loaded at the Birch Inlet camp approximately 3 kilometres north of the head of Birch Inlet. Difficult swamp country separate the two landings from the bulldozed track which continues south for 45 kilometres to the Moores Valley camp and airstrip. The airstrip, situated 5 kilometres S.S.E. of the camp site, is serviceable for light aircraft, except in very wet weather when the quartz gravel surface becomes soft. In total the airstrip is approximately 20 kilometres by Bombardier from the central working area of E.L. 9/74. Helicopter access is highly convenient either from Hobart or from the Hydro Electric Commission base at Strathgordon, 40 kilometres to the east.

Within the Lucas Volcanic belt of E.L. 9/74 vehicle access is only possible by the use of tracked machines. Two Bombardiers, a 'J5' and a 'Muskeg', gave excellent service during the 1977 field season, providing a means of constructing tracks and transportation for personnel and supplies.

The streams are difficult to follow on foot, there being a thick network of scrubby Ti tree and Banksia intertwined with Bauera, occasional horizontal scrub also exists. The bush cover although open in places is generally quite thick, the rain forest areas being almost impenetrable. Cut line access is essential for these more heavily timbered zones.

029.

251030



LEGEND

- Significant Basemetal Mineralization
- Mt Read Acid Volcanics
- Road
- Track

DATE 18-4-78
GEOL C.D.S.
DWN J.P.M.
CHKD M.C.R.

GEOPEKO LIMITED
KING ISLAND

Scale: 1: 500 000

Fig No. 1

LOCATION MAP
E.L.9/74

PHYSIOGRAPHY

The Innes Peak Mt. Lee Range, capped by Owen Type siliceous conglomerate, rises to 664m and forms a spectacular western boundary to the elongate belt of acid volcanics exposed unconformably beneath. The terrain over the Cambrian volcanics within E.L. 9/74 is highly variable however three broad subdivisions can be recognized.

North of the Mt. Lee Saddle the exposed rugged slopes of the D'Aguilar Range and the Innes Peak - Mt. Lee Range form a natural amphitheatre up to 1.5 kilometres wide (See Photo No. 1).

Low lying gently undulating button grass covered swamp occurs to the east of Innes Peak (See Photo No. 2).

The southern portion of E.L. 9/74 extending 4 kilometres north of Thirkell Hill is generally steeply undulating with deeply incised river systems to the east, west and south. The Hales River forms an impenetrable boundary for vehicle access south to Moores Valley from the northern volcanics.



Photo No. 1.

The exposed rugged slopes of the Innes Peak - Mt. Lee Range form the western boundary of the gently undulating Lucas Volcanics.



Photo No. 2.

View south from the Mt. Lee Saddle overlooking the Lucas Volcanics between Thirkell Hill (west) and the D'Aguilar Range (east).

VEGETATION AND CLIMATE

The lowlying areas with an elevation between 200-300 metres consist of poorly drained peat soils and support hummocky button grass and sedge varieties. The majority of the area under discussion is covered with a mixture of buttongrass, low Eucalypts, Ti tree and Bauera vine. This type of vegetation is exclusive to areas underlain by rock types which produce a very poor soil horizon but a fairly thick peat cover. (see Photo No. 3).

Dense rain forest containing Myrtle, Celery-top pine, Sassafras, Leatherwood, and horizontal varieties occurs as isolated zones dependant upon more favourable soil types (see Photo No. 4).

The west coast climate restricts active field exploration to the period from mid - December to late April. Outside this period, the weather may be fine and clear ocassionally, but snow and very heavy rain storms are possible. Extremely boggy conditions and river flooding make it impossible to work in this area during the winter months.



Photo No. 3.

C-Horizon auger drilling using a Bombardier 'Muskeg' mounted Jacro 200 rig. Vegetation types: Sedge, Eucalypts, Ti tree, bottle brush and Bauera vine are typical for the majority of E.L. 9/74.



Photo No. 4.

View looking East towards the Hales River Camp Site showing zones of dense rain forest.

EXPLORATION PROGRAMME - PHASE 1

The Phase 1 details of the exploration programme for E.L. 9/74 were finalized during December 1976. The programme consisted of the following exploration steps.

1. Aerial photographs both colour and black and white at an approximate scale of 1:16,000 and 230mm x 230mm size were obtained giving stereo coverage of the area. Enlargements to 1:10,000 scale were also obtained for field mapping.

2. Positive transparencies of the machine plots at 1:10,000 scale of the Gordon 1:15,840 scale topographical series prepared by the Lands Department were obtained for the area. Minor redraughting highlighted the stream systems and produced four B1 size base maps which cover approximately 85% of the Exploration Licence.

3. Geopeko Limited's existing field equipment stocks were supplemented by hired equipment for the duration of the programme. Rapidly constructed easily portable camp sites, based upon tents and locally fabricated shelters together with bottled L.P. gas operated refrigeration and cooking appliances, were considered suitable for this regional exploration project.

4. Field personnel and equipment reached the Birch Inlet Bombardier Landing by launch and barge from Strahan on the 15th January 1977.

5. Field work consisting of detailed geological mapping, geochemical drainage sampling, C-horizon auger sampling and ground follow up of airborne magnetic and electro - magnetic anomalies was carried out intensively over the Cambrian volcanic belt. Difficult access within the area necessitated the erection of three working base camps. Field work was completed by 19th March 1977 at which time all personnel and equipment entered Exploration Licence 27/76 (Geopeko Limited).

6. A total of 736 rock samples were collected during the regional mapping to aid in later correlation for the geological map preparation. All rock samples are in storage at Geopeko Limited, Devonport, Tasmania, and their field locations are described on sheets KT 9/74 1D-4D included in this report. 40 samples selected from throughout the area, were thin sectioned and petrographically described by I.R. Pontifex and Associates, Adelaide. The samples selected were representative of rock types altered rock types and rocks where the field determination was vague. The locations of the thin sectioned samples are shown on the geological maps, Sheets KT 9/74 1A-4A, in the folder of this report. Mr. I.R. Pontifex's report is enclosed as appendix No. 10.

7. A selection of 82 rock samples diagnostic of areas containing significant chlorite or sericite alteration and visible sulphide mineralization was despatched to A.C.S. Laboratories, Adelaide, for geochemical analysis. Cu, Pb, Zn, Ag, Mn, Cd and Fe were determined by A.A.S. techniques. As was analysed by the modified Gutzeit method and Sn by Emission Spectrography. Six samples have been analysed for Ba by Emission Spectrography and two of these were also determined for low level Gold by the CRA/AAS method. The sample numbers, locations and assay results are recorded on the geological maps sheets KT 9/74 1A to 4A enclosed in the folder of the report. Sample book numbers and assay results are also tabulated as appendices No's 7, 8 and 9.

8. 959 stream sediment samples were collected from the streams, creeks and rivers draining the prospective area, approximately 60 square kilometres. A duplicate sample was collected at every tenth location. The sample location points were measured from a known starting point and all locations were marked off with flagging tape and numbered aluminium tags. The nature of the sample, location, number and assay value have been recorded in sample books which are filed at Geopeko Limited, Devonport, Tasmania. Sheets KT 9/74 1C - 4C in the folder of this report display the locations of the drainage samples.

The overall sample density over the prospective area was approximately 16 samples per square kilometre. It was decided prior to the survey that oversampling to a degree would be preferred considering the cost of resampling.

The drainage samples were dried, rebagged if required, and forwarded to A.C.S. Laboratories in Adelaide. The -80 mesh fraction was separated and analysed for Cu, Pb, Zn, Ag, Mn, and Fe by A.A.S. Ba and Sn were determined by Emission Spectrographic analysis schemes ES2 and ES3. In addition 34 samples were selected on their resulting Pb, Zn analysis for Semi-quantitative Emission Spectrographic analysis schemes ES1-4 and ES6. The sample book numbers and assay results are enclosed as appendices No.s 1, 2 and 3.

Cumulative frequency plots of the log 10 concentrations of Cu, Pb and Zn were calculated in order to determine statistical threshold values, the results of which are shown in figure 3. Sheets KT 9/74 1B-4B in the folder of this report show the Cu, Pb and Zn results obtained at each stream sediment sample location and display in coloured symbolic form zones considered anomalous by a combination of eyeball and statistical methods.

9. 308 soil samples, including 26 duplicates were collected from 256 holes throughout Exploration Licence 9/74. Two holes were drilled for a total depth of 27.70m for orientation purposes on survey line 16,000N. 30 orientation samples, including duplicates, were taken at 1 metre intervals down the holes. A sample depth of 2.0 metres or bedrock was chosen as the optimum depth for geochemical sampling purposes after examination of the orientation soil sample results. Soil sampling was carried out by a Jacro 200 Auger rig mounted on the rear of a Muskeg Bombardier. Holes inaccessable to the drilling rig were hand augered to refusal, a total of 68 hand auger holes were completed. The samples were dried, rebagged if necessary and despatched to A.C.S. Laboratories in Adelaide. The -80 mesh fraction was separated and analysed for Cu, Pb, Zn, Ag, Fe and Mn by A.A.S. Ba and Sn were determined by Emission Spectrographic analysis schemes ES2 and ES3. In addition 29 samples were selected on their resulting Pb, Zn analyses for semi-quantitative Emission Spectrographic analysis schemes ES1-4 and ES6. The sample book numbers and assay results are enclosed as appendices No.s 4, 5 and 6. Sheet KT 9/74 1E shows in profile from the Cu, Pb and Zn results obtained from the C-horizon auger sampling of grid traverses 16,000N, 14,400N and 11,200N and Viking prospects numbers 1, 5 and 10.

10. Geophysics carried out by Geopeko Limited within Exploration Licence 9/74 consisted of V.L.F. (E.M.) ground follow up of airborne E.M. anomalies resulting from the two previous airborne surveys. The northern one third of the area was flown by a Scintrex Turair survey during 1973. The southern one third of the Birch Inlet area was flown by a Geoex H 400 survey during 1975. An electromagnetic anomaly interpretation was available for both surveys, the aeromagnetics have since been contoured by L.A. Richardson and Associates from the analogue tapes. Ground follow up also included some localized magnetics and I.P. over selected zones.

The geophysical profiles for V.L.F. (E.M.), Magnetics and I.P. are contained in the folder of this report, sheets KT 9/74 1F - 14F.

11. The expenditure incurred by Geopeko Limited up until the 17th January 1978 is shown as follows:

Drilling Maintainance	$ 433.43
Geology	39,471.34
Aerial Surveys	319.00
Draughting	1,071.76
Leasing	2,333.26
Gridding	2,363.24
Geochemistry (Base) (including auger drilling)	22,766.40
Geophysics (Base)	3,175.43
General Field Expenses	22,503.38
Administration Expenses	14,490.20
Geochemistry (Sydney)	3,479.00
Geophysics (Sydney)	3,725.00
TOTAL	$116,131.44

GEOLOGY

REGIONAL SETTING AND TECTONIC HISTORY

The Lower-Middle Cambrian rocks within Exploration Licence 9/74 are known as the Lucas Volcanics and are equivalents of the Mt. Read Volcanics to the north and the Lewis River Volcanics to the south. Essentially the Lucas Volcanics consist of a sequence of fine to coarse grained porphyritic quartz-feldspar rhyolitic lavas, pyroclastics, volcaniclastic sediments and a high level intrusive coarse grained rhyolitic porphyry.

The Proterozoic rocks to the east of the D'Aguilar Range have been described by Martin (Australasian Minerals 1974) as undifferentiated quartzites, quartz-mica schists, tourmaline-quartz schist, silicified dolomites, graphitic schists and chlorite schists. The eastern contact between the Cambrian sequence and the Proterozic units is a faulted and folded unconformity. Complex structures within the Proterozoic suggest at least three periods of folding. The faulting is dominantly north-south and dips towards the east. The faulted contact between the Precambrian and the Cambrian volcanics is suggested to be a steep reverse fault with neglibible horizontal movement.

From aerial photographs, minor structures and the repetition of sequences both in the same order and in reverse order, suggested to Martin (1974) that isoclinal folds were probably present in the Cambrian Volcanics. However Martin could not substantiate this claim in the field.

It was suggested by Martin that the magnetic data over the northern part of the volcanics defined an anticlinal structure plunging to the north and that the reversal of stratigraphic units in the acid volcanics correlates with this interpretation. However, Salisbury (Union Oil Development Corporation, 1975) strongly refutes Martin's magnetic interpretation and states there is definitely no magnetic evidence of such a fold. Deakin, L.A. Richardson and Associates, 1977, suggests that due to the poor flight line positioning and recovery, severe distortion within the aeromagnetic compilation makes structual interpretation highly questionable.

On the western fringe of the Cambrian volcanics is the Owen Conglomerate, a unit of oligomictic quartz conglomerates and well bedded quartz mica sandstones. This Ordovician sequence shows a faulted, north striking anticline with steep dips to the west and more gently easterly dips in the far north of E.L. 9/74. The anticline plunges gently to the north at about 15^{o}. The sequence has been cut by a number of major strike faults which do not display any evidence of horizontal displacement.

LOCAL GEOLOGY.

For this section refer to the geological maps, Sheets KT9/74 1A-4A in the folder of this report, and to the Mineralogical Report No. 2228 by I.R. Pontifex and Associates, Appendix No. 10.

The geological maps are essentially 'fact maps' but also display a certain amount of interpretation. A close inspection of the mapping along the streams will show that in areas of good bedrock exposure the local geology is complex.

The silica-clay-sericite alteration within the rhyolitic lava groundmass and in the tuff matrix, together with the pseudo-porphyritic appearance of the coarser tuff crystals and the often superimposed cleavage, often seriously prohibits the accurate field distinction between tuffs, lavas, tuff lavas and porphyries in hand specimen.

In addition to the many rocks identified and plotted during the reconnaissance programme, an additional 736 rocks were sampled for closer macroscopic study after diamond sawing. In an attempt to overcome the problems of individual rock identification and thus the definition of rock units within the Lucas Volcanics, 40 rock samples were selected for petrographic examination by I.R. Pontifex. The selection contained both 'problem' rocks and those representative of major rock suites within the area. In few cases were his interpretative descriptions contrary to the original field name. The detailed petrographic report occurs as an appendix to this report.

A significant field observation that was highlighted by the thin section study, was the intensity of alteration of many of the lithologies. The complete sericite replacement of plagioclase phenocrysts, chlorite alteration of biotite and often complete pervasive sericitic alteration of the feldspar phenocrysts and groundmass feldspar is widespread - a favourable characteristic of this acid volcanic environment.

PRECAMBRIAN

Undifferentiated Quartzites and Metasediments.

The Precambrian lithologies located to the east of the Lucas Volcanics consist of undifferentiated quartzites, quartz mica schists, tourmaline quartz schists and as described by Martin (1974), silicified dolomites, graphitic schists and chloritic schists.

Sample number KR 3241, situated in the Hales River area on Sheet KT 9/74 4A, is representative of the undifferentiated massive quartzites. It is composed of a tightly packed, poorly sorted bedded aggregate of augular quartz grains. Sample number KR 3360 is characteristic of the Precambrian metasediments and is described as a muscovite garnet sericite quartz schist.

CAMBRIAN

Porphyritic quartz-feldspar rhyolitic lava

This massive unit dominates the lithologies of the Lucas Volcanics and is mappable as a continuous belt from approximately 2.5km NE of Mt. Lee south to the Hales River a total exposure length of 15km. The width of this rhyolitic lava belt varies considerably from 500m near Viking 7 to approximately 2.4km in the area south of Thirkell Hill.

Although mapped and dicussed as a single unit, minor macroscopic differences are present throughout this lava belt. It is conceivable to assume that several stratigraphic equivalents are present.

Essentially the rock contains subhedral to euhedral phenocrysts of quartz and feldspar randomly disposed within a homogeneous microcrystalline groundmass showing relict flow textures. The quartz phenocrysts are commonly subrounded and embayed, with an average diameter of about 2mm. Quartz crystals usually amount for 30% of the total rock, with the feldspar content averaging approximately 20%.

The groundmass consists of diffuse cryptocrystalline to microcrystalline potash feldspar with abundant, small (0.1mm) mottled allotriomorphic quartz. Commonly a penetrative hydrothermal alteration of the glassy groundmass results in a fairly uniform gross composition of extremely fine clays, shredded sericite and fine mottled patches of ultra fine quartz.

This is a lava of gross rhyolitic composition, examples of which are represented by KR 1276 and KR 3280.

Feldspar-quartz-biotite rhyolitic porphyry:

This unit is the second most dominant lithology of the Lucas Volcanics and abuts the eastern contact of the porphyritic quartz feldspar rhyolitic lava for the majority of its exposure from the Mt. Lee Saddle to the Hales River.

Characteristically this unit is green to dark green in colour and contains phenocrysts of feldspar (plagioclase and or orthoclase) quartz and biotite. The phenocrysts are generally within the medium grained (1-5mm) size category, however some feldspar phenocrysts have been observed to measure up to 18mm (KR 3180). These phenocrysts occur in a homogeneous, distinctly microcrystalline mosaic of quartz and potash feldspar containing minor disseminated fine chlorite and biotite. Throughout this porphyry the biotite phenocrysts are generally moderately chloritised, the feldspars however are variably replaced by sericite, clays and very rarely epidote and carbonate. Within this unit there is generally no clear evidence of primary flow, however widespread shearing associated with shredded streaky metamorphic sericite is present. These porphyries are of gross rhyolitic composition and are interpreted to be of extrusive or very high level intrusive origin, examples are represented by KR 3180 and KR 1031.

Vitric quartz-feldspar crystal tuff-lava.

Three restricted outcrop zones of this rock type occur in the northern third of E.L. 9/74, one approximately 3.5km northeast of Mt. Lee overlain to the west unconfomably by Ordovician lithologies, another is situated in the 'saddle area' approximately 600 metres south east of Mt. Lee and the third is a narrow zone intercalated with the major unit of porphyritic lava and situated approximately 1 kilometre due east of Mt. Lee .

Distinct boundaries for these exposures are somewhat hypothetical as these lithologies are considered, for the purposes of geological mapping, to be gradational into the porphyritic rhyolitic lavas.

Basically these rocks have a gross rhyolitic composition and are described as pyroclastic flow rocks which display the petrographic characteristics of both tuffs and lavas. Within E.L. 9/74 however the relict flow characteristics, so necessary for the accurate classification of this unit, are commonly dominated by and thus confused with the superimposed shear texture. They have an altered glassy matrix, however this is not a eutaxitic welded-shard type matrix which may be distinctive of an ignimbrite or a vitric tuff, but is closely related to the glassy groundmass of the rhyolitic lavas. Subhedral to euhedral quartz and feldspar phenocrysts are generally present, but splintery fragments of these components and minor lithic fragments are also present, indicating a tuff characteristic.

Thin section examples of this rock type are KR 1188 and KR 1228.

Rhyolitic lithic pyroclastics

The nomenclature used in this report for the classification of lithic pyroclastics is based largely on the size of the contained fragments and follows thatterminology described by Joplin (1971) in 'A Petrography of Australian Igneous Rocks'. Fragments over 32mm in diameter are called bombs and, when compacted and cemented, they give rise to a coarse grained rock called agglomerate. Fragments measuring from 4mm to 32mm are called lapilli, and smaller ash fragments form tuffs.

Within E.L. 9/74 eight separate zones of rhyolitic lithic pyroclastics have been mapped, it is considered that several of these zones may however be stratigraphic equivalents.

1. On sheet KT 9/74 1A, immediately east of Mt. Lee and underlying the unconformity below the Ordovican 'Owen Type' conglomerate, the dominant lithology is represented by samples KR 1234 and KR 1209. The unit is described as a lithic quartz-feldspar crystal tuff of gross rhyolitic composition containing tuffaceous crystal detritus ranging in size from 0.1mm - 5mm (35-40%), and volcanic (lapilli) lithic fragments (30%) up to 10mm. These two size fractions are very roughly bedded through an ultra fine matrix composed largely of tuff detritus consisting of broken quartz crystals and fragments of rhyolitic lava. The angular and poorly sorted nature of the quartz crystals is characteristic of their tuffaceous origin. The lithic fragments consist mainly of glassy rhyolitic lava showing pervasive clay-sericite alteration. Sample KR 1209 has accessory oxidized pyrite within a quartz vein and several grains of disseminated pyrite of possible late volcanogenic origin.

2. Situated approximately 2.6 kilometres north east from Mt. Lee and extending in a south westerly direction for nearly 3 kilometres is a unit composed dominantly of a pale to dark green lithic tuff. This rock, represented by KR 3119, consists of a tightly packed, semi-fused and roughly bedded aggregate of vocanic rock fragments of common composition averaging about 2mm in diameter. These fragments consist of a patchy diffuse microcrystalline to cryptocrystalline mosaic of potash feldspar, subordinate quartz and extremely fine sericite and biotite, minor scattered volcanic quartz crystals are also identified. Patchy, streaky and flame like textures in the groundmass of the fragments indicates a turbulent flow. Within the unit, local concentrations of sericite and or fine quartz with associated hematite are common. This unit is considered a tuffaceous equivalent of the porphyritic rhyolitic lava immediately to the west and represented by KR 1302.

3. Situated adjacent to the Innes Peak campsite on sheet KT 9/74 2A is a unit of lapilli lithic crystal tuff represented by KR 3273. This pale green pyroclastic is of gross rhyolitic composition and is intercalated within the major unit of porphyritic rhyolitic lavas. The lapilli size fragments up to 10mm diameter are in fact fragments of that porphyritic rhyolite. The groundmass consists of feathery-spherulitic potassic glass with quartz and plagioclase phenocrysts. Smaller fragments are also vaguely porphyritic but have a cryptocrystalline quartz-potash feldspar groundmass. In total, fragments form about 30% of the rock. Quartz crystals are generally subrounded to subhedral, embayed and often broken. The euhedral crystals of plagioclase and othoclase are unaltered and like the quartz crystals have a vaguely bedded distribution.

4. As shown on sheets KT 9/74 2A and 3A, a major unit of lapilli lithic crystal tuff has been interpreted over a strike length of approximately 6.5 kilometres. This unit has an average width of 500 metres and has as its western contact the extensive zone of feldspar quartz biotite porphyry. The south eastern portion of this pyroclastic unit is interpreted as being faulted against the Precambrian, whereas further to the north the eastern contact is against a unit of Cambrian conglomerate. Although dominated by lapilli lithic crystal tuff varieties, mapping has identified both crystal tuff and lithic tuff zones occurring as possibly intercalated units. The rock unit consists essentially of a pale to dark green rock fragments within a matrix of essentially the same composition. Subrounded and embayed volcanic quartz crystals up to 7mm diameter occur scattered randomly throughout a stressed quartz-chlorite-sericite groundmass. Detailed mapping and petrography would be required to more fully define this pyroclastic unit.

5. On sheet KT 9/74 3A, approximately 300 metres east of Thirkell Hill, a narrow 100 metre wide unit of lapilli lithic crystal tuff occurs similiar in character to unit 3 above. This zone is situated between the major unit of porphyritic quartz-feldspar rhyolitic lava to the east and a narrow linear zone of volcaniclastic sandstones to the west.

Complexity of fragment size is characteristic of this lithology with sizes rangingfrom tuff to agglomerate. Lapilli size fragments dominate and are interpretedtobe of porphyritic rhyolitic origin. The cleaved groundmass of the lithic fragments contains quartz and plagioclase phenocrysts. Together with subrounded to subhedral quartz crystals and euhedral crystals of plagioclase, accessory hematite and locally intense zones of quartz veining have been identified within this zone.

6. Located on sheets KT 9/74 3A and 4A and situated to the east of the Owen Type conglomerate occurs a unit of dark green lithic crystal tuff. This unit is based upon limited mapping and thus is highly interpretative, particularly to the west. KR 1374 is representative of this lithology and emphasises that it is possibly a facies varient of crystal tuff pyroclastic. The rock is of gross rhyolitic composition and contains acid volcanic fragments, augular volcanic quartz crystals, minor potash feldspar crystals and biotite pseudomorphs after hornblende crystals all vaguely layered through an extremely fine matrix. This matrix consists essentially of ultra-fine potash feldspar, sericite and chlorite together with micro-mottled diffuse quartz eratically scattered throughout.

7. Located in the south eastern section of sheet KT 9/74 3A and extending south for 1 kilometre onto sheet KT 9/74 4A is narrow unit of lithic crystal tuff. This unit occurs in contact with the feldspar-quartz-biotite porphyry and is composed of a tightly packed and hetrogeneous aggregate of rhyolitic porphyry fragments. The fragments are extensively stressed, partly recrystallised and fractured, but primarily they consist of prominant quartz phenocrysts, smaller plagioclase phenocrysts and chloritised biolite scattered throughout a microcrystalline mosaic of quartz and potash feldspar. This unit is represented by KR 3045.

8. This lithic crystal tuff unit is interpreted as being intercalated with the broad zone of porphyritic quartz-feldspar rhyolitic lava. The unit is approximately 300 metres wide and extends for 1.4 kilometres north of the Hales River, as shown on sheet KT 9/74 4A. KR 3070 is representative of this unit and consists of an aggregate of porphyritic rhyolite fragments containing phenocrysts of quartz, potash feldspar, minor biotite and accessory hornblende. The goundmass is sheared and apparently relict flow textured with evidence of sporadic chlorite and sericite alteration. Fragments of microcrystalline quartz mosaic, clusters of small plagioclase crystals and larger quartz crystals are scattered throughout and more or less bedded with the fragments.

Rhyolitic crystal pyroclastics.

The nomenclature used in this section of the report is identical to that described for the lithic pyroclastics, however in this case the fragments are mainly shattered crystalline material.

A total of seven separate units of rhyolitic crystal pyroclastics have been mapped, it is however not implied that these zones are unique stratigraphic units and all geological boundaries are interpretative.

1. On sheet KT 9/74 1A, 2 kilometres north east of Mt. Lee a narrow 100 metre wide zone of pale green crystal tuff is situated within a unit of porphyritic quartz-feldspar rhyolitic lava. The crystal tuff consists largely of a loosely packed aggregate of quartz crystals, generally embayed, broken and angular in a hetrogeneous matrix of sericite and siliceous glass products. Hematite occurs as an accessory mineral in one mapped example.

2. Located on sheet KT 9/74 2A approximately 700 metres south east of Mt. Lee a narrow 100 metre wide zone of crystal lithic tuff has been interpreted as an intercalated unit between the porphyritic quartz feldspar rhyolitic lava to the east and a zone of vitric quartz-feldspar crystal tuff lava to the west. The rock contains abundant euhedral, embayed volcanic quartz crystals approximately 3mm in diameter together with subordinate euhedral plagioclase crystals. The groundmass is ultrafine consisting of mainly fine crystals and quartz splinters. The unit is interpreted to have close affinities with the neighbouring tuff lava lithology.

3. Situated on sheet KT 9/74 2A approximately 3 kilometres east of Innes Peak a crystal tuff unit has been interpreted between the major porphyry belt and a unit of Cambrian conglomerate to the east. The rock has very close affinities with the feldspar-quartz-biotite rhyolitic porphyry to the west. KR 1025 consists of subrounded and embayed quartz crystals (40%), smaller recrystallized argillised and attenuated feldspar crystals and clouded biotite are all randomly disposed throughout a schistose ultrafine matrix. The matrix consists of braided, shredded streaks of sericite, locally intergrown with fine biotite within diffuse microcrystalline to cryptocrystalline quartz. This example (KR 1025) is interpreted by Pontifex, on account of its biotite content, to be a sheared equivalent of the feldspar-quartz-biotite rhyolitic porphyry facies.

4. Approximately 3 kilometres north east of Thirkell Hill is situated a broad unit of rhyolitic crystal tuff pyroclastics. This unit approximately 2.5km in length and 1.5km in width is located between the major zones of the rhyolitic porphyry to the east and the porphyritic rhyolitic lava to the west. KR 1042 is representative of this lithology and consists of a roughly layered, loosely packed aggregate of subrounded to subhedral and embayed volcanic quartz crystals the average size of which is 1.5mm. Minor crystals of potash feldspar, plagioclase, altered glass and quartz mosaic all form part of this aggregate situated within a sericitic matrix composed of ultra fine quartz and clouded ultra fine potassic material. Shearing appears to have dominated the rock unit and remains defined by sericite.

5. Intercalated within the porphyritic quartz feldspar rhyolitic lava belt approximately 2.5 kilometres south south west of Thirkell Hill is situated several narrow zones of crystal lithic tuff represented by KR 1364. This rock consists of angular splinters of volcanic quartz crystals, minor subrounded-embayed quartz crystals, glassy rhyolitic volcanic rock fragments and rare oxidized biotite flakes vaguely layered throughout an ultra fine matrix. The weakly sheared matrix contains shredded sericite intimately mixed with cryptocrystalline silica, accessory chlorite and minute quartz splinters.

6. Approximately 2.2 kilometres south east of Thirkell Hill occurs a narrow unit of pale to dark green crystal tuff intercalated within the unit of rhyolitic porphyritic lava and is interpreted as having fine grained volcaniclastic sediments on its contacts with the lava. The rock is composed dominantly of a loosely packed aggregate of quartz crystals within a hetrogeneous matrix of sericite and siliceous glass products and is thus similiar to unit 1 above.

7. This unit outcrops immediately east of the Hales River camp site and is shown on sheet KT 9/74 4A as a narrow unit of rhyolitic crystal lithic tuff approximately 2 kilometres in length. The unit is represented by KR 3033 and consists of a massive pale green rock distinctively cut by closely spaced, variably continuous foliation planes of sheared sericite and biotite, giving the rock a streaky texture. The rock consists dominantly of subrounded and embayed quartz crystals, subhedral crystals of plagioclase and potash feldspar and minor microcrystalline to cryptocrystalline quartz-feldspar fragments (15%) all randomly scattered throughout an ultrafine quartz chlorite matrix.

Sandstones.

This unit outcrops along the eastern flanks of the Innes Peak - Mt. Lee Range and as shown on sheets KT 9/74 1A and 2A occurs primarily between 2 kilometres north and south of Innes Peak. A second zone is located approximately 2 kilometres north of Mt. Lee. Two smaller more well defined zones occur approximately 2 and 4 kilometres respectively north east of Mt. Lee.

These four zones, although described as the one lithology and interpreted as Cambrian, display a variety of characteristics. The zone situated at the base of Innes Peak is largely unmapped and thus its boundaries are highly interpretative. It is comprised of a white - pale green fine to medium grained sandstone. Occurring as float samples, within the unit of porphyritic rhyolitic lava east of Innes Peak, numerous examples have been recorded of a pale course grained sandstone containing rounded quartz pebbles up to 10mm diameter. Alteration of this zone appears restricted to minor cleavage and quartz veiwing.

Angular bright red chert fragments up to 4mm diameter are characteristic of the medium to course grained sandstone unit north of Mt. Lee. From photo interpretation and follow up geological reconnaissance a major fault parallels this zone and abundant secondary quartz veining and specular hematite appear closely associated with this tectonism.

A narrow 70m wide zone of fine grained hematitic sandstone has been defined within the Sediment Breccia unit approximately 4 kilometres north east of Mt. Lee. A narrow unit of fine grained laminated volcaniclastic sandstone occurs within this zone indicating local geological complexity.

Approximately 2 kilometres north west of Mt. Lee a zone of sandstone interpreted to be approximately 150m in width occurs between the Sediment Breccia and the porphyritic rhyolitic lava units. The grain size varies from fine to course within this unit and hematite is a major constituent of several of the mapped outcrops.

Conglomerate.

The contact between the Cambrian Lucas Volcanics and the Precambrian quartzites is a folded unconformity faulted towards the southern portion of E.L. 9/74. On sheets KT 9/74 2A and 3A the dominant Cambrian rock type near the contact is a white, highly siliceous, polymictic conglomerate comprised of small to large well rounded boulders of chert, quartzite and quartz mica schist. This conglomerate is characteristically poorly sorted, quite unlike the Ordovician Owen conglomerate which occurs to the west and the north of the exposed Cambrian lithologies. Martin (1974) describes fine grained quartz muscovite sandstone and quartz-mica schist units overlying and interbedded with the coarse conglomerates. The overall thickness of this conglomeratic zone is approximately 300 metres.

Sedimentary breccia.

This rock unit varies in colour from pale brown to dark red-brown dependant upon its total hematitic colour and is located on sheet KT 9/74 1A approximately 3km north east of Mt. Lee. The unit is comprised of a medium to coarse grained breccia containing angular fragments of siliceous fine grained sediments, chert and quartz in a hematitic matrix, the rock is strongly sheared and evidence of quartz and hematite veining is abundant.

This lithology has an interpreted strike length of approximately 2.5km and a mapped thickness of 250 metres. It is situated within a massive unit of porphyritic quartz-feldspar rhyolite, however on a local scale it has contacts with Cambrian sandstones containing hematite, vitric quartz-feldspar crystal tuff lavas and volcaniclastic sediments.

It is interpreted that this rock is a sedimentary breccia of Cambrian age.

Volcaniclastic sediments.

During the regional reconnaissance geological mapping of E.L. 9/74 twelve separate zones of volcaniclastic sediments have been identified. These zones are shown on sheets KT 9/74 1A - 4A the largest of which occurs in the upper part of the Cambrian sequence immediately underlying the Ordovician unconformity to the north and south of Thirkell Hill. This zone has been mapped as approximately 200m in outcrop width, however as with the other smaller volcaniclastic units, in areas of limited outcrop geological boundaries are highly interpretative and require confirmation by more detailed mapping.

These fine grained friable sediment zones are highly prone to weathering and thus outcrops even within the creek beds are sparce. Locally the geology within these zones is complex, and when insufficient outcrop, distorted bedding, penetrative cleavage and alteration effects are considered, a wide variety of lithological types have been grouped to form this unit of volcaniclastic sediments.

Broadly the unit is characterised by pale grey to dark green fine grained laminated shales however the grain size does vary from siltstone range to sandstone. Macroscopically the unit is poorly sorted with loosely packed aggregates of quartz grains within an extremely fine quartz clay matrix. Within the sandstone size range single quartz crystals,together with volcanic fragments,occur as hetrogeneous,loosely packed grains in an ultrafine chloritic clay matrix.

Penetrative cleavage is widespread and destrictive to these fine grained rocks, in the more massive varieties discontinuous streaks of sericite throughout the matrix imply an incipient cleavage.

ORDOVICIAN

Owen conglomerate

This unit consists of an oligomictic quartz conglomerate of variable thickness represented sporadically by fine quartz sandstone and pebble beds. These units form the Thirkell Hill - Innes Peak - Mt. Lee range and sedimentary features within the upper conglomerates have indicated a westward facing.

TERTIARY.

Macquarie Beds.

The Tertiary Macquarie Beds occur along the western boundary of E.L. 9/74 faulted against the Ordovician lithologies. South of the Hales River (Sheet KT 9/74 4A) downfaulting of the Moores Valley graben has caused the Lucas volcanics to remain overlain by substantial depths of Ordovician and Tertiary sediments.

The Macquarie Beds are typically flat or gently dipping sediments which consist of unconsolidated sands and conglomerates.

QUATERNARY

Alluvial and colluvial deposits.

Detritus, course and fine scree, glacial debris, alluvium and fluvioglacial sands and silts occur sporadically throughout the area. These units have not been mapped and were avoided during the drainage sampling programme. Talus material of Owen type conglomerate and sandstone occurred along the eastern slopes of the Innes Peak - Mt. Lee range, the western slopes of the D'Aguilar range contain material of similiar origin. It was found that in all but the smallest of streams evidence of Cambrian lithologies was available where the drainage had cut down through alluvial and fluvioglacial deposits of the large valleys.

GEOCHEMISTRY

Drainage Sampling

Stream sediment sampling was selected as an appropriate exploration technique for the Birch Inlet area. The sample spacing of 200 metres and the size fraction for analysis, -80 mesh, were selected based upon experience within northern Tasmania and elsewhere.

A total of 959 samples of the fine sediment material were collected from the streams, creeks and rivers draining the prospective area. In addition to samples being taken every 200 metres, one in ten locations were resampled to serve as checks.

Due to the difficulty of accurately locating the sample points on aerial photographs in this region, film copies of the base maps were used to record the locations, each point being measured on the ground from a recognisable stream junction. The sample locations were marked with flagging tape and numbered aluminium tags. Details of location and type of sample were recorded on cards (KD series). The samples were dried and rebagged (as necessary) prior to despatch to A.C.S. Laboratories in Adelaide.

The -80 mesh fraction was separated and analysed for Cu, Pb, Zn, Ag, Mn, Fe, Ba and Sn. In addition 34 samples were selected on their resulting Pb, Zn, analyses for Semi-quantitative Emission Spectrographic Analysis schemes ES1-4 and ES6.

The methods of sample preparation and analysis and the analytical results are tabulated in Appendices No's 1, 2 and 3 and are presented on the following maps located in the folder of this report.

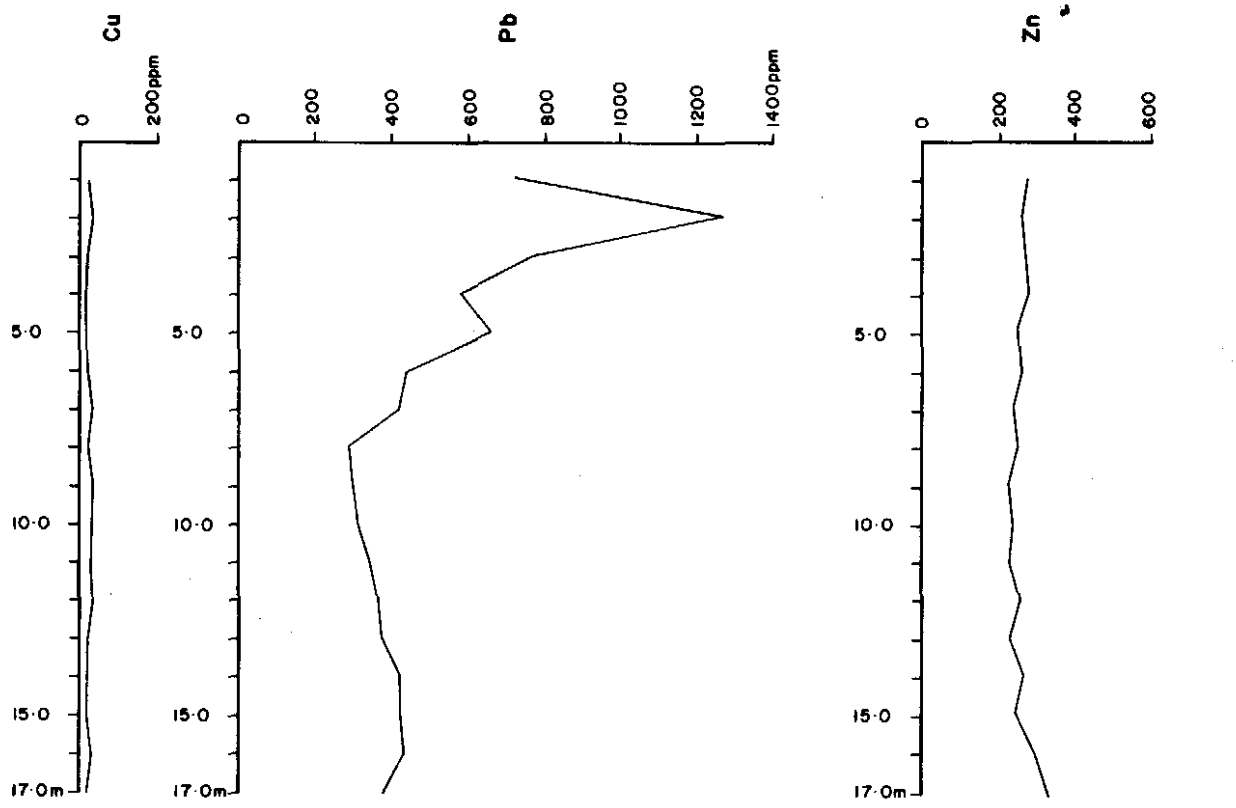
- Drainage Sample Location Map
  Sheets KT 9/74 1C-4C

- Drainage Geochemical Results Cu, Pb and Zn
  Sheets KT 9/74 1B-4B

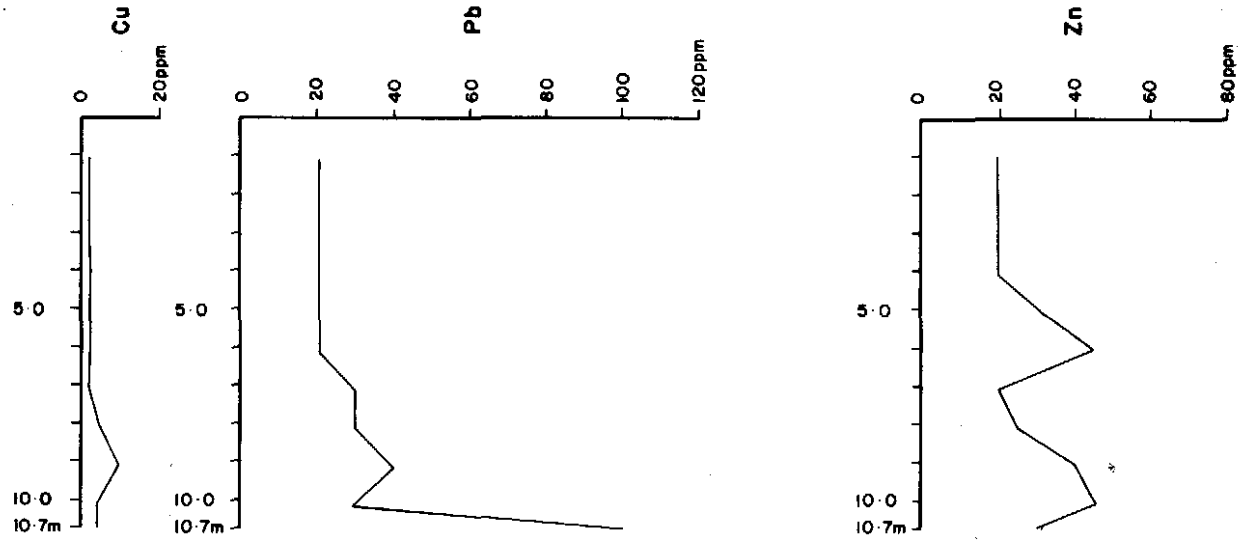
The rationale in selecting the elements other than Cu, Pb and Zn was that the survey should be aimed at locating not only 'obvious' ore occurrences but also geochemically prospective areas in which the ore occurrences are non outcropping or sub outcropping.

C-Horizon Auger Sampling

A brief orientation survey was carried out on two holes at grid traverse 16000N. Two holes were auger drilled to 17m and 10.7 metre respectively with geochemical samples collected at 1 metre intervals down the hole. On a basis of the orientation results for Cu, Pb and Zn (Fig 2) a sample depth of 2.0 metres or bedrock was chosen as an optimum depth for geochemical purposes.



16 000 N / 250 W ; 0-17·0m



16 000 N / 300 W ; 0-10·7m

5 cm

E.L. 9/74 BIRCH INLET, TAS.
GEOCHEMICAL ORIENTATION PROGRAMME
Cu, Pb and Zn PROFILES

FIG. No. 5

C-Horizon soil sampling was carried out using a Jacro 200 auger rig, mounted on the rear of a Muskeg Bombardier. (see Photo No. 3). Holes inaccessable to the drilling rig were hand augered to refusal.

C-Horizon sampling was carried out at 50 metre centres on grid traverses 16,000N, 14,400N and 11,200N in order to obtain regional geochemical backgrounds for the Lucas Volcanics and also to compare the results obtained by the shallower augering (10cm) of the A1 horizon by Union Oil. From a study of the comparisons it was noted that the two methods of geochemical soil sampling do not correlate for Cu, Pb and Zn results. C-Horizon sampling gave high results in areas of negative character from A1 sampling. In general C-Horizon sampling gave considerably more character and a good correlation existed between iron and manganese. In conclusion it was decided that previous A1 horizon sampling results would not be used for fine interpretation. Sheet KT 9/74 1E in the folder of this report shows in profile form the Cu, Pb and Zn results obtained from the C-Horizon auger sampling of grid traverses 16,000N, 14,400N and 11,200N.

C-Horizon auger geochemistry was carried out at 25 metre centres on tape and compass reconnaissance grids over selected prospect areas, the results of which are presented in profile form for Cu, Pb and Zn on Sheet KT 1E in the folder of this report.

All soil samples were dried and rebagged (as necessary) prior to despatch to A.C.S. Laboratories in Adelaide. The -80 mesh fraction was separated and analysed for Cu, Pb, Zn, Ag, Fe, Mn, Ba and Sn. In addition 29 samples were selected on their resulting Pb, Zn analysis for Semi-quantitative Emission Spectrographic analysis schemes ES1-4 and ES6. The sample book numbers (KS series), method of preparation and analysis and assay results are enclosed as appendices No's 4, 5 and 6.

Rock Sample Geochemistry

In conjunction with the detailed geological mapping and stream sediment sampling a total of 736 rock samples were collected. Film copies of the base maps were used to record the locations of the samples with respect to the known locations of the drainage samples. Details of location and sample type were recorded on cards (KR series). These locations and the KR series numbers are described on the Rock Sample Location Maps Sheets KT 9/74 1D-4D included in the folder of the report.

A selection of 82 rock samples, diagnostic of areas containing significant chlorite or sericite alteration and visible sulphide mineralization was despatched to A.C.S. Laboratories Adelaide, for geochemical analysis. All samples were analysed for Cu, Pb, Zn, Ag, Fe, Mn, Cd, As and Sn. A total of 6 samples were determined for Ba, two of which were also analysed for low level Au. The sample numbers, locations and assay results are recorded on the geological maps, Sheets KT 9/74 1A-4A enclosed in the folder of the report.

The method of preparation, analysis and the results, recorded in numerical order, are included as appendices No's 7, 8 and 9.

Statistical Treatment

For the purpose of determining 'threshold' approximations for the Cu, Pb and Zn results from the geochemical drainage sampling survey, the area of Cambrian Lucas Volcanics, approximately 60 square kilometres, was treated as a single population.

Probability density distribution plots or 'cumulative frequency' plots of the log 10 concentrations of Cu, Pb and Zn were calculated in order to determine the threshold values or approximate dividing points between overlapping lognormal distributions. The results are shown in Figure 3.

Cumulative Frequency Plots - Drainage Geochemistry - Cu, Pb and Zn

Cambrian LUCAS VOLCANICS, Birch Inlet E.L.9/74

25106

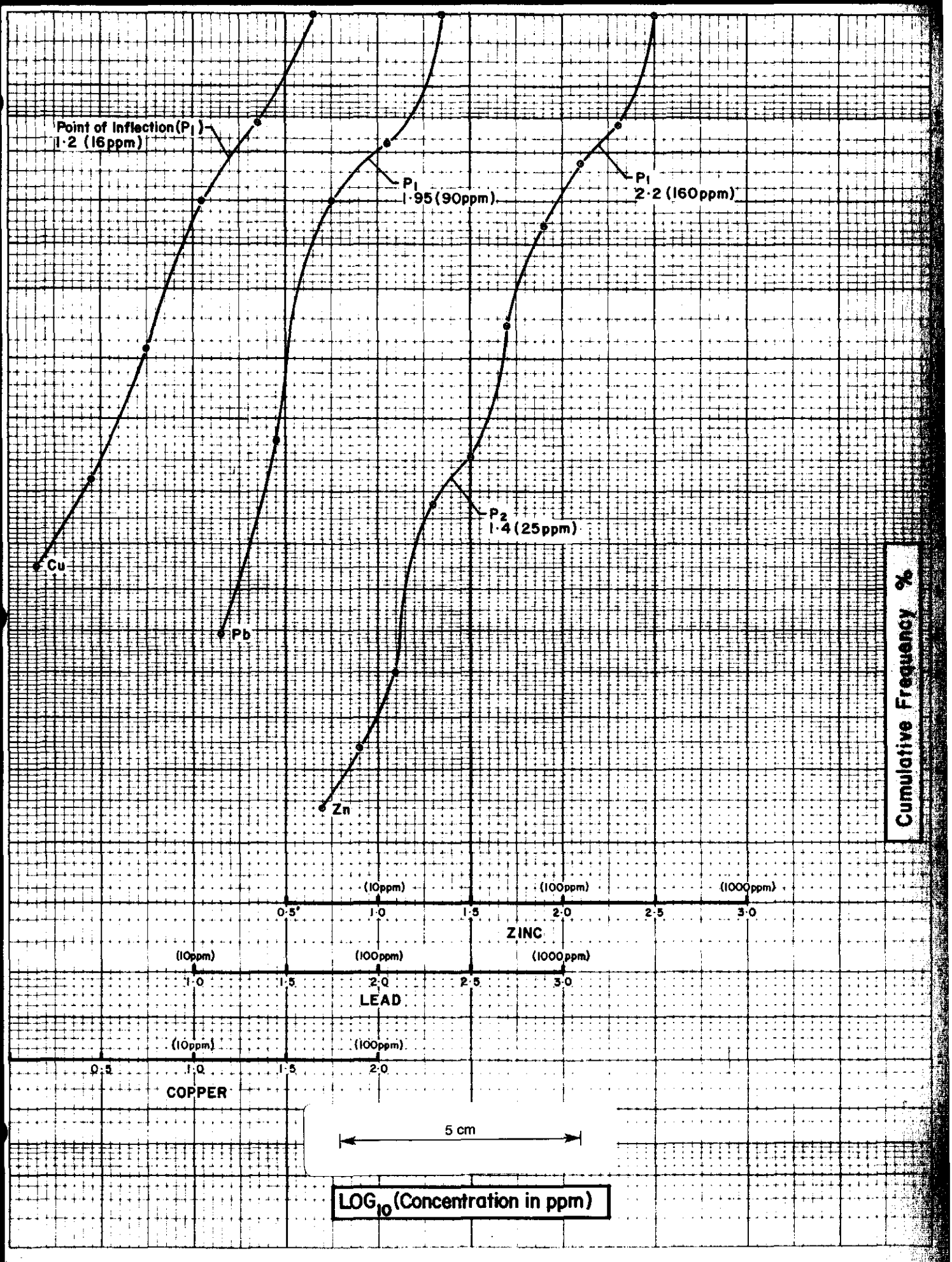


FIG No. 4

The method of selection of thresholds is subjective as several assumptions are required; the most important being that the accuracy of assaying is as good as the reported figures imply.

In this case the cumulative frequency plots for the Cu, Pb and Zn results approximate to straight lines and the points of inflection are not obvious. Cu and Pb both showed a single point of inflection (P1), however Zn in addition to the higher P1 threshold is also characterized by a subtle P2 inflection point.

The following are the thresholds above which the values can be considered statistically anomalous. The number of values above the threshold is expressed as a percentage of the total (in brackets).

Birch Inlet E.L. 9/74 Cambrian Volcanics

	Cu	Pb	Zn
P1	16ppm (0.2%)	90ppm (0.2%)	160ppm (0.2%)
P2			25ppm (18%)

For the purposes of displaying significantly anomalous areas within the zone of the Cambrian Volcanics it was found that the statistically derived thresholds (above) were highly restrictive. Eyeball techniques, aided by the statistical treatment of the data, were selected as the most appropriate method for interpreting anomalous Cu, Pb and Zn values. By choosing a lower threshold value for each element, and thus incorporating a higher total percentage of values above the threshold, a more natural grouping of anomalous results was possible.

Two major grouping of anomalous results have been observed, namely Viking 22 and Viking 23 which are detailed in the discussion section of this report.

Sheets KT 9/74 1B-4B display in colour coded symbolic format the creek systems interpreted as anomalous by the 'eyeball' technique. Threshold values for Cu, Pb and Zn are 10ppm, 70ppm and 100ppm respectively.

GEOPHYSICS.

Geophysics carried out by Geopeko - L.A. Richardson and Associates during the 1976-77 field season consisted of V.L.F. (E.M.) follow up of A.E.M. anomalies from the previous Scintrex 1973 and Geoex 1975 Airborne surveys. Some I.P. and magnetics were also employed. Aspects of the geophysical surveys are described by Deakin (1977), a brief summary of which follows.

V.L.F. Electromagnetics.

An abundance of moderate to strong V.L.F. anomalies was recorded within E.L. 9/74. Comparison of the recorded anomalies with case history data, both from Tasmania (B.M.R.) and elsewhere, indicates that a number of the recorded anomalies are very good. Many of the broad anomalies are characteristic of deep seated conductors or they may be the result of recording across conductors at an oblique angle. Alternatively they may be due to broad regional geological effects.

The V.L.F. results need to be considered with three aspects in mind.

1. Any E.M. method in unable to discriminate between ionic and electronic conductors. In this environment of S.W. Tasmania, conductive shear zones give rise to large E.M. anomalies comparable to those expected from ore bodies.

2. In this environment near surface and subsurface resistivities are very high. Consequently even very poor conductors provide a large conductivity contrast and are easily detected by E.M. techniques.

3. Broad anomalies may be the effect of a variation in lithology with no associated 'anomalous' conductor.

Magnetics

No interesting magnetic anomalies have been recorded.

Induced Polarization

I.P. was carried out on two Viking prospects in the area and the results fit well with the pattern of the Union Oil Development Corporation data.

In summary Deakin has stated that further geophysical surveys over prospect grids should encompass both E.M. and I.P. techniques. E.M. methods can be used to locate airborne E.M. anomalies and massive conductors but the I.P. method is more specific in delineating subsurface conductors. In theory massive conductors do not provide the ideal I.P. target, however in practice most orebodies have some I.P. signature.

The work of magnetics as an exploration tool has not been established to date. If magnetics can serve as a focussing tool for orebody location its applicability poses no problems apart from those imposed by the geography.

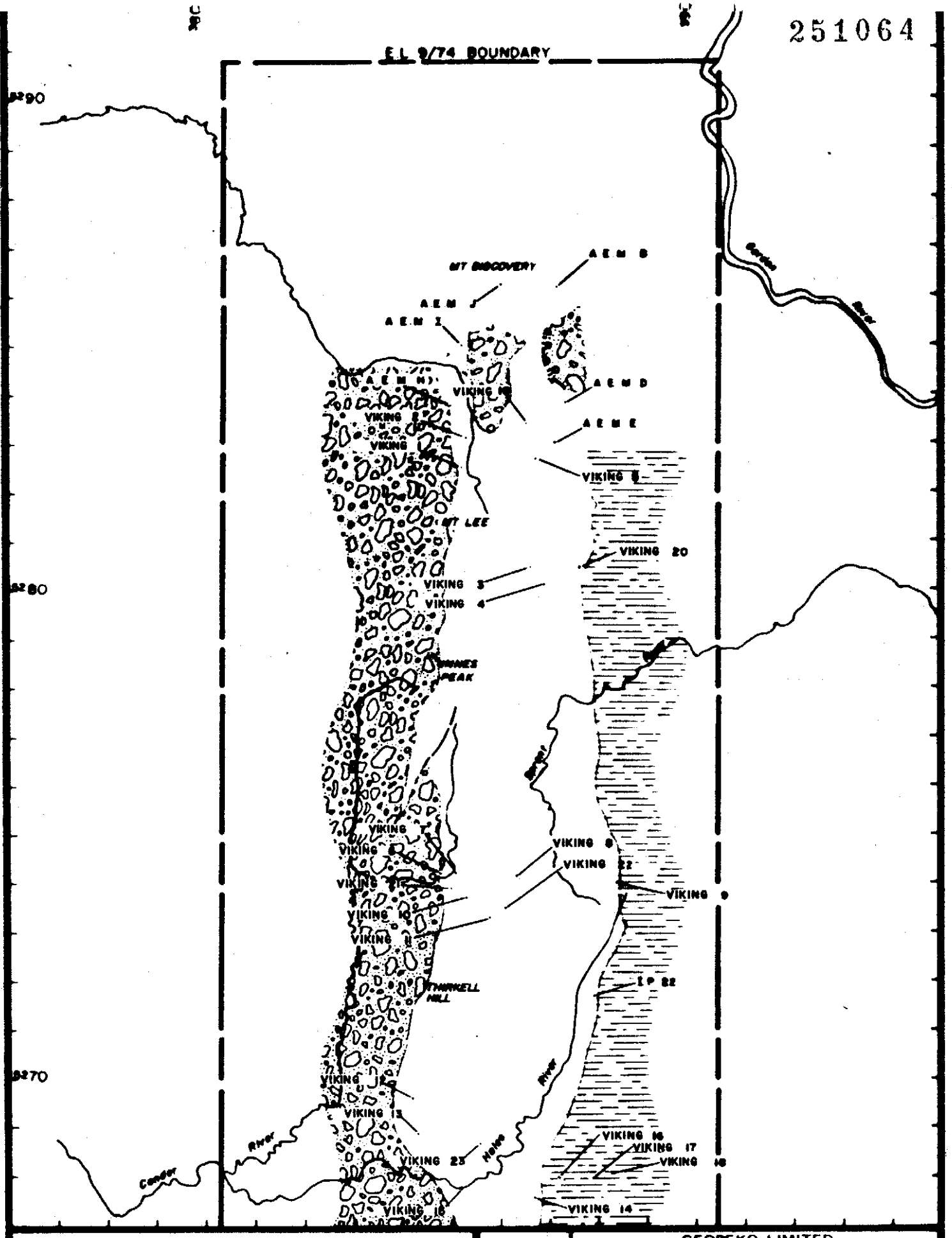
DISCUSSION OF RESULTS

The results of the 1976/1977 Birch Inlet programme are here discussed in detail. Prospects have been termed 'Viking' and generally occur in numerical order from North to South. (See Fig. 4). All exploration areas have been designated with (AMG) Australian Map Grid co-ordinates relating to the approximate geographic centre of the anomalous area. The reader is refered to the Geological Maps Sheets KT 9/74 1A-4A in the folder of the report on which all the prospects under discussion are located.

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E.L. 9/74 BOUNDARY



LEGEND

- Ordovician conglomerate.
- Cambrian volcanics.
- Precambrian undifferentiated quartzites and metasediments

DATE July '75
GEOL C. D. S.
DWN J. P. M.
CHKD M. C. R.

GEOPEKO LIMITED
KING ISLAND

Scale 1 : 50,000

Fig. 4

PROSPECT LOCATION MAP
BIRCH INLET E.L. 9/74

5 cm

1. A.E.M. J (386 200E, 5 286 200N A.M.G.).

Geological investigation indicated that this anomaly is located within an Ordovician sequence of bedded coarse sandstones and quartzites striking approximately 004° and dipping 15° to the west.

2. A.E.M. B (387 300E, 5 286 200N A.M.G.).

This area was inaccessable during the 1976/1977 field programme but appears from the regional geological mapping and photo geological evidence to lie within the Ordovician.

3. A.E.M. I (385 400E, 5 285 000N A.M.G.).
A.E.M. H (385 200E, 5 283 800N A.M.G.).

These two linear anomalies are situated within the Ordovician sandstone sequence and are approximately coincident with photo linears. They are likely to represent faults.

4. Viking 1 (385 400E, 5 282 500N A.M.G.).

There are a variety of rock lithologies within the Viking 1 area (Geological Map Sheet KT 9/74 1A). As with the majority of the Viking prospects the 1:10000 scale geological mapping has not given a detailed picture of the area but the following rock units are present proceeding up the sequence from east to west.

1. Massive porphyritic lava of rhyolitic composition.

2. Lithic tuffs and lithic crystal tuffs containing hematite veins.

3. Ordovician sandstones and Owen conglomerate.

The presence of abundant hematite at this location may be of significance when compared to the similiar hematite occurrence at 'The Blow' (Mt. Lyell) which is also localized at the Owen conglomerate contact.

Three east-west tape and compass traverses were surveyed across the Viking 1 area for a total of 1,475 metres.

Hand auger C-horizon geochemistry was carried out at 25 metre centres on traverse 100N. Peak values for Cu, Pb and Zn were 20ppm, 90ppm and 130ppm respectively with the average background values approximating 6ppm, 50ppm and 20ppm. The stream sediment expression in this locality is negligible. V.L.F. (E.M.) was completed on all three traverses, the data suggesting a broad, large magnitude quadrature anomaly west of the area covered. Anomalous character at 100N/125E indicates a good conductor, however in phase anomalous values at 00/175W and 100S/100W suggest near surface effects.

I.P., resistivity and magnetics were read on line 100N, with little variation in values of apparent resistivity and flat magnetics. The I.P. results show a marked increase in background chargeability to the west from 00E.

In summary the V.L.F. and I.P. data suggest a zone of poor conductivity and high chargeability to the west of Viking 1.

5. Viking 2 (385 500E 5 283 100N A.M.G.).

This prospect area is within close proximity to Viking 1 and has massive hematite veining associated with Upper Cambrian sandstones. These sandstones are locally intercalated with Cambrian volcanics, namely a rhyolitic porphyritic lava unit and a fine volcaniclastic sandstone.

Two east west traverses were tape and compass gridded for a total of 1.35 line kilometres. The magnetic character of traverse 150S was flat and the V.L.F. (E.M.) response from both traverses suggested a significant quadrature to the west.

Viking 1 and Viking 2 are considered prospective zones on account of their spatial similarities with the Mt. Lyell 'Blow' occurrence. To date geophysics and geochemistry, both drainage and C-horizon, have been inconclusive. The geophysical suggestion of an anomaly to the west of these two prospects has yet to be geologically examined. The anomalous response may be associated with the unconformable contact between the Lucas Volcanics and the Ordovician Unit.

6. A.E.M. E (387 300E, 5 283 000N A.M.G.).
A.E.M. D (387 500E, 5 283 800N A.M.G.).

These A.E.M. anomalies were inaccessable during the 1976/77 field programme but appear from the regional geological mapping and photogeological evidence to be associated with the unconformable contact between the Lucas Volcanics and the Precambrian. The linear anomaly A.E.M. E. is coincident with a photo linear and thus may represent a faulted contact.

7. Viking 19 (386 700E, 5 283 400N A.M.G.).

The 1:10,000 geological map of this prospect area includes the following lithologies.

1. To the east occurs a coarse grained rhyolitic lithic crystal tuff unit containing extensive sericitic alteration of the volcanic rock fragments and associated hematite.

2. Quartz-feldspar porphyritic lava of rhyolitic composition also containing fine hematite.

3. A sediment breccia zone occurs up to 250 metres wide over a strike length of 2 kilometres. This unit is characterized by coarse angular quartz fragments (2cm) within a fine grained hematitic-chloritic matrix. Massive veins of hematite and quartz are present throughout the Viking 19 area and south to Viking 5 (See below).

4. Fine to coarse grained sandstones containing local concentrations of fine grained hematite.

A possible comparison can be drawn between the sediment breccia unit and the 'chert breccia cap rock' from the North Lyell Orebody - Queenstown. The Ba content of the sediment breccia zone is much lower however, than that from North Lyell.

A 550 metre east-west tape and compass traverse was read with V.L.F. (E.M.) and magnetics. The surface magnetic results do not correlate with the aeromagnetic data. The V.L.F. data suggests two large conductors at 00/150W and 00/75E, these are the largest E.M. responses within the Birch Inlet area. However V.L.F. topographic effects are proportional to strata conductivity and the large response at Viking 19 could be the combined effect of topography and more conductive rocks.

Stream sediment sampling showed no significant response in this area except a slightly anomalous Pb character within the lithic tuff zone to the east (maximum value 70ppm Pb).

8. Viking 5 (386 900E, 5 282 700N A.M.G.).

This area was briefly investigated by Australasian Minerals and Union Oil Development Corporation on account of a minor Zn rock chip anomaly. Mapping at 1:10000 scale has placed the prospect at the contact between a rhyolitic lithic tuff and a quartz feldspar porphyritic lava of rhyolitic composition containing hematite.

Two short east-west tape and compass traverses were completed for a total of 595 metres and C-horizon geochemistry was carried out by hand auger methods at 25 metre centres. Weakly anomalous Pb and Zn values were recorded, 160ppm Pb at 50N/00, and 130ppm Zn at 50S/150E. Despite the discouraging C-horizon geochemistry at Viking 5, the close proximity of the favourable geology at Viking 19, only 700 metres to the north, rates this area as one of significance.

The aeromagnetic data from the 1973 Turair survey shows a magnetic anomaly in close association with the Viking 5 - Viking 19 area, however the ground magnetic data over the Viking 19 prospect showed a flat profile. Doubts as to the accuracy and therefore usefulness of the airborne survey data are suggested.

9. Viking 3 (386 800E, 5 280 500N. A.M.G.).

Scintrex, from the Turair survey, categorized this A.E.M. anomaly as distinctive. Anomaly location, ground geophysics and geological mapping were hindered due to dense rain forest. A local reconnaissance tape and compass grid was completed for a total of 1100 metres.

The geological mapping within the prospect area has indicated that a contact exists approximately 200 metres of the west between a massive coarse quartz feldspar biotite porphyry of rhyolitic composition and a lithic crystal tuff zone. Minor traces of sulphides have been noticed within samples of both lithologies.

V.L.F. (E.M.) was read over the grid, however no anomalous character was obvious in the data which has a moderate amplitude of up to 18% noise. Ground geophysics, on account of the access problem in this area, appears to have failed to locate the A.E.M. anomaly which is likely to lie further to the west.

10. Viking 4 (387 100E, 5 280100N. A.M.G.).

This anomaly is situated within a broad zone of massive coarse quartz-feldspar-biotite porphyry of rhyolitic composition. Two short tape and compass traverses were completed in thick vegetation for a total of 475 metres. The line lengths have proved insufficient to adequately locate the A.E.M. with ground V.L.F. (E.M.) techniques, data from the N-S traverse suggests an anomaly further to the north.

Photogeological evidence suggests this anomaly may be associated with a fault zone. Appart from a single spot high (10ppm Cu) the drainage geochemical results from this area are insignificant.

11. Viking 20 (387 800E, 5 280 500N, A.M.G.).

This A.E.M. anomaly was not investigated during the 1976/77 field programme but appears from the 1:10000 scale geological mapping to lie within a zone of tuffaceous shales containing pyrite mineralization adjacent to the Precambrian quartzites.

12. Viking 21 (385 200E, 5 273 900N. A.M.G.).

This A.E.M. anomaly has yet to be located adequately. A total of 925 metres of tape and compass gridding, consisting of three E-W traverses from a single N-S baseline, was completed over a zone of volcaniclastic sandstones and shales. To the east of this zone is a major belt of porphyritic quartz feldspar rhyolitic lava containing locally significant sericite alteration.

V.L.F. (E.M.) was carried out over the prospect grid with inconclusive results, there is however a suggestion of a large magnitude (25% in phase) anomaly west of 100W/100S.

13. Viking 6 (385 000E, 5 274 200N. A.M.G.).
Viking 7 (385 300E, 5 274 200N. A.M.G.).

These two I.P. anomalies are situated at approximately 16000N/1450W and 1600N/1225W respectively, (U.O.D.C. grid co-ordinates) and were located by Union Oil Development Corporation during the 1974/75 field season. The prospects are located only 300 metres to the north of Viking 21 and appear to be related to the same belt of volcaniclastic sediments.

Viking 7 occurs at the contact with the quartz feldspar porphyry lava belt whereas Viking 6 is located near the unconformable contact with the Ordovician sediments to the west.

C-horizon geochemistry was carried out at 50m centres along U.O.D.C. traverse 16000N from 1500W to 2100E, however no significant base metal response was recorded in the Viking 6 and Viking 7 areas. Stream sediment geochemistry indicates one anomalous Zn value (90ppm) in close proximity to Viking 7.

V.L.F. (E.M.) data from 1500W - 1000W on line 16000N shows three large magnitude (up to 20% or more) in phase anomalies which have associated poor quadrature responses, suggestive of good conductors. These anomalies may be significant on account of their associated I.P. response (U.O.D.C.). It must be noted here that many of the U.O.D.C. I.P. anomalies are probably artificial end of time effects.

14. Viking 10 (385 500E, 5 273 700N A.M.G.).

The Viking 10 A.E.M. anomaly was classified by Geoex 1975 as a 'C' category anomaly. Deaking (1977) considers this anomaly to be one of the most significant of the survey. Geological mapping, C-horizon auger geochemistry and ground geophysics were carried out on a reconnaissance tape and compass grid totalling 4.2 line kilometres. The initial V.L.F. (E.M.) response was orientated in an east-west direction and a good correlation exists between the anomalies across strike. The grid orientation was decided to suit the V.L.F. (E.M.) results and is therefore N-S.

The anomaly is situated within a broad zone of quartz feldspar porphyry of gross rhyolitic composition with evidence of significant sericite alteration and veining north of 300N. Immediately to the west is situated a major linear unit of tuffaceous sandstones and shales. Viking 21 is approximately 400 metres N.W. and Viking 6 and 7 lie 700 metres and 600 metres respectively to N.W.

C-horizon auger geochemistry was carried out at 25 metre centres on traverse 00E from 700N to 700S. Anomalous results for Pb and Zn are summarized below:

Cu 10 ppm,	Pb 190 ppm,	Zn 870 ppm	at 125N/00E.
Cu (2 " ,	Pb 360 " ,	Zn 140 "	025S/00E.
Cu 10 " ,	Pb 430 " ,	Zn 80 "	325S/00E.
Cu 10 " ,	Pb 840 " ,	Zn 340 "	600S/00E.
Cu 10 " ,	Pb1190 " ,	Zn 260 "	625S/00E.

Approximate background values for Cu, Pb and Zn are in the order of (2ppm Cu, 20ppm Pb and 30ppm Zn).

V.L.F. (E.M.) was recorded along all three grid lines and anomalous responses with good east-west correlation are suggestive of real subsurface conductors. The I.P. chargeability data from line 00E however is flat and this information downgrades the V.L.F. (E.M.) anomalies and suggests they are probably related to ionic conductors which may be fault or fracture zones. The magnetometer data from traverse 00E was inconclusive and does not correlate well with the aeromagnetics.

15. Viking 22 (386 300E, 5 273 350N A.M.G.).

Stream sediment geochemistry during the 1976/77 field season has outlined an anomalous zone of Cu, Pb and Zn results approximately 800 metres east of Viking 10. A total of four anomalous drainage samples appear to be draining a NNE striking ridge of porphyritic quartz-feldspar rhyolitic lava immediately west of a unit of crystal tuff and crystal vitric tuff pyroclastics.

Maximum drainage values for Cu, Pb and Zn are 40ppm Cu, 100ppm Pb and 90ppm Zn, regional background values are approximately (2ppm Cu, 20ppm Pb and 25ppm Zn.).

Significant values for Pb and Zn were achieved at approximately 700 metres north of Viking 22 during the C-horizon geochemical programme on U.O.D.C. traverse 16000N. Maximum values for Pb and Zn are 380 ppm Pb, 330ppm Zn at 250W/16000N and 560ppm Pb, 210ppm Zn at 50W/16000N.

16. Viking 11 (386 000E, 5 273 300N. A.M.G.).

This Geoex 'possible A.E.M. anomaly' is situated within a pyroclastic belt of crystal tuffs and crystal vitric tuffs of the Lucas Volcanics. Dense rain forest restricted gridding activities and follow up V.L.F. (E.M.) on the 1000 metres of tape and compass grid have proved inconclusive. Small amplitude shallow anomaly responses were recorded, however the reverse quadrature V.L.F. (E.M.). data indicates the anomaly may be caused by conductive overburden. The magnetic data is flat. No geochemical character exists in the drainage results to the east of Viking 11 although the Viking 22 geochemical anomaly lies only 700 metres to the north west.

17. Viking 8 (386 500E, 5 274 150N A.M.G.).

This questionable U.O.D.C. gradient array I.P. anomaly was tested with V.L.F. (E.M.) and magnetics. The prospect was also studied with the C-horizon geochemical auger programme along the U.O.D.C. traverse 16000N.

The geophysical data over the prospect was generally featureless and the C-horizon results indicated an eratic geochemical background.

The lithology present is identical with that of Viking 11, 900 metres to the south, namely a zone of crystal tuff and crystal vitric tuff pyroclastics.

18. Viking 9 (388 600E, 5 274 000N, A.M.G.).

This prospect was considered worthy of additional study on account of the coincident U.O.D.C. I.P. feature and the Geoex E.M. anomaly.

Geological mapping at 1:10000 scale places this prospect at the unconformable contact between the conglomeratic unit of the Lucas Volcanics and the Precambrian quartzites.

The strong V.L.F. response in this location, (large magnitude, high frequency in phase and quadrature) indicates a shallow source and a poor conductor.

19. I.P. 22 (388 100E, 5 271 700N. A.M.G.).

This U.O.D.C. I.P. anomaly received a brief reconnaissance investigation during the 1976/77 field season. The geological mapping places the anomaly at the faulted contact between a unit of lithic tuff pyroclastics and the Precambrian quartzites. No additional geophysical follow up has been carried out however like Viking 9, if this reponse is not just an end of line effect, the source of the anomaly is considered to be the faulted Precambrian contact.

The regional stream sediment sampling results from this locality show no significant base metal response.

20. Viking 12 (384 400E, 5 269 600N A.M.G.).
Viking 13 (384 550E, 5 268 900N A.M.G.).

These prospect areas were briefly investigated during the geological mapping and stream sediment survey however the deeply incised nature of the stream valleys and their associated dense vegetation (rain forest and horizontal) prevented any geophysical follow up during the 1976/77 field season. The A.E.M. anomaly zone in this area has been categorized by Geoex as a 'possible anomaly'.

Viking 12 is situated within a narrow tuffaceous shale unit whereas Viking 13, approximately 700 metres to the south, appears to lie close to the contact of this tuffaceous horizon with a lithic crystal tuff horizon containing minor pyrite.

The regional drainage survey shows three anomalous Cu Values (10ppm) in close proximity to Viking 12 and 13, the drainage sample results however, may be associated with Viking 23.

21. Viking 23 (385 800E, 5 268 700N A.M.G.).

A broad zone of anomalous Cu, Pb and Zn has been defined by the regional stream sediment survey during the 1976/77 season. The area covers approximately 1.5 square kilometres and a total of fifteen anomalous drainage samples occur with maximum Cu, Pb and Zn values of 20ppm, 240ppm and 90ppm respectively. Soil geochemistry (Union Oil Development Corporation 1974/75) on traverse 10400N and C-horizon auger geochemistry (Geopeko Limited 1976/77) on traverse 11200N confirm the drainage response. The following is a brief summary of the maximum C-horizon geochemical results obtained:

Cu 15 ppm, Pb 130 ppm, Zn 420 ppm at 11200N/500W
Cu 30 ppm, Pb 860 ppm, Zn 880 ppm at 11200N/550W
Cu 25 ppm, Pb 320 ppm, Zn 420 ppm at 11200N/650W

The lithologies present within this anomalous zone include a massive fine grained quartz feldspar porphyritic lava of rhyolitic composition, containing locally intensive sericitization, minor sulphides and magnetite. Towards the south western portion of the area a contact occurs between the porphyritic rhyolite and a lithic crystal tuff. Immediately south of the Hales River the Lucas Volcanics abutt against the faulted Moores Valley graben containing Tertiary Macquarie Bed units.

22. Viking 14 (386 900E, 5 267 600N A.M.G.).

This A.E.M. anomalous zone has been defined by Geoex (1975) as being made up of two anomalies which could possibly be altitude effects. The zone is located within rugged terrain 500 metres south of the Hales River.

The results from the regional 1:10000 scale geological mapping indicate that this anomaly is situated within a zone of sheared flow banded crystal lithic tuff adjacent to the faulted contact of the Precambrian lithologies containing minor hematite.

Ground geophysical follow up consisted of reading V.L.F. (E.M.) on two tape and compass traverses for a total of 100 metres. Traverse 100N was read with magnetics. The geophysical response with both techniques was inconclusive.

23. Viking 15 (385 400E, 5 267 700N A.M.G.).

This D category Geoex (1975) A.E.M. anomaly is located in close proximity to the Hales River within a unit of lithic crystal tuffs containing minor disseminated pyrite.

Due to the rugged nature of the terrain and the dense rain forest vegetation, preliminary geological and geophysical follow up was conducted along the bed of the Hales River.

V.L.F. (E.M.) and magnetics were carried out along a 600 metre traverse, the eastern portion of which encountered a zone of steep waterfalls and cascades. The magnetic data recorded a flat profile, however a very large and sharp in phase and quadrature anomaly resulted from V.L.F. (E.M.) techniques.

Stream sediment geochemical methods were not able to be carried out in this section of the drainage system.

24. Viking 16 (387 400E, 5 268 000N A.M.G.).
Viking 17 (388 100E, 5 268 000N A.M.G.).
Viking 18 (388 500E, 5 268 100N A.M.G.).

These three Geoex (1975) A.E.M. anomalies appear, from regional geological mapping, to be located within the quartzites, micaceous sandstones and schists of the Precambrian.

Visible pyrite was evident within fine grained micaceous shale horizons.

A single 600m tape and compass treaverse at Viking 16 resulted in an encouragingly large in phase V.L.F. (E.M.) anomaly.

The Viking 17 anomaly was considered by Geoex to be of high priority. A single 400 metre traverse using V.L.F. (E.M.) and magnetic methods indicates that the anomaly probably is located further to the south.

V.L.F. (E.M.) and magnetics at Viking 18 over a short 300 metre traverse gave poor responses. The comparison of the magnetic data with the aeromagnetic contours from the Geoex survey indicates that like Viking 17, the ground follow up was probably carried out north of the anomaly centre.

The region stream sediment programme in this region shows no significant response.

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GEOPEKO LIMITED

C.D. STRICKLAND,
SENIOR GEOLOGIST.

APPROVED:

M.C. ROGERS,
SUPERVISING GEOLOGIST.

APPENDIX NO. 1

ANALYTICAL RESULTS

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2001	2	20	20	(2	10	0.04
2	10	20	65	(2	20	0.11
3	2	(20	20	(2	20	0.02
4	2	20	25	(2	10	0.06
5	(2	(20	20	(2	(5	0.02
6	(2	20	20	(2	5	0.02
7	(2	(20	25	(2	5	0.02
8	(2	20	25	(2	(5	0.02
9	(2	30	30	(2	30	0.16
10	(2	20	55	(2	20	0.04
1*	(2	20	20	(2	20	0.03
2	(2	(20	25	(2	(5	0.01
3	(2	(20	25	(2	(5	0.01
4	(2	(20	60	(2	(5	0.01
5	(2	(20	35	(2	5	0.02
6	(2	(20	25	(2	10	0.04
7	5	30	50	(2	300	0.46
8	(2	20	25	(2	30	0.06
9	(2	(20	30	(2	20	0.03
20	(2	20	20	(2	20	0.03
1	(2	(20	25	(2	20	0.04
2	(2	(20	20	(2	30	0.04
~~2**~~	~~(2~~	~~(20~~	~~15~~	~~(2~~	~~30~~	~~0.04~~
3	(2	(20	25	(2	30	0.03
4	(2	(20	20	(2	(5	0.01
5	(2	20	20	(2	20	0.02
6	(2	20	25	(2	30	0.04
7	(2	20	20	(2	90	0.07
8	(2	20	40	(2	100	0.08
9	2	30	35	(2	200	0.08
30	2	30	35	(2	400	0.34
1	2	30	35	(2	300	0.20
2	(2	(20	30	(2	(5	0.02
3*	(2	(20	20	(2	5	0.01
4	(2	(20	20	(2	10	0.08
5	(2	(20	25	(2	5	0.02
6	(2	(20	55	(2	5	0.01
7	(2	(20	40	(2	(5	0.01
8	(2	20	30	(2	(5	0.02
9	(2	(20	50	(2	10	0.01
40	5	(20	50	(2	20	0.03
1	2	20	15	(2	20	0.02
~~1**~~	~~(2~~	~~(20~~	~~15~~	~~(2~~	~~10~~	~~0.02~~
2	5	20	80	(2	30	0.04
3	(2	(20	35	(2	20	0.03
4*	2	20	30	(2	10	0.02
5	5	20	25	(2	10	0.04
KD 2046	5	(20	20	(2	10	0.03

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2047	(2	20	30	(2	20	0.05
8	5	(20	30	(2	(5	0.10
9	5	(20	30	(2	(5	0.03
50	5	(20	30	(2	10	0.04
1	(2	20	40	(2	20	0.06
2	(2	20	40	(2	10	0.04
3	(2	20	35	(2	10	0.04
4	(2	20	30	(2	20	0.04
5	(2	(20	30	(2	20	0.03
6	(2	(20	30	(2	(5	0.02
7	2	(20	40	(2	10	0.04
8	5	20	30	(2	20	0.07
9	2	30	55	(2	50	0.10
60	2	20	50	(2	20	0.07
1*	(2	20	50	(2	10	0.06
2	(2	20	30	(2	20	0.05
3	(2	20	40	(2	20	0.08
~~3**~~	~~2~~	~~(20~~	~~30~~	~~(2~~	~~10~~	~~0.08~~
4	(2	20	40	(2	10	0.04
5	5	20	65	(2	20	0.42
6	(2	(20	50	(2	20	0.08
7	(2	20	35	(2	20	0.05
8	(2	30	50	(2	40	0.07
9	(2	30	30	(2	30	0.05
70	(2	20	50	(2	80	0.08
1*	(2	20	40	(2	70	0.06
2	(2	20	40	(2	60	0.07
3	(2	20	40	10	70	0.06
4	2	(20	30	(2	30	0.06
5	2	20	90	(2	40	0.14
6	5	20	50	(2	40	0.09
7	2	(20	50	(2	30	0.05
8	2	20	40	(2	40	0.10
9	2	(20	50	(2	50	0.08
80	2	(20	30	(2	20	0.04
1*	5	(20	30	(2	10	0.04
2	2	20	30	(2	60	0.14
3	(2	(20	30	(2	40	0.06
4	(2	20	30	(2	5	0.04
5	(2	20	50	(2	110	0.20
6	(2	(20	40	(2	20	0.14
7	(2	(20	35	(2	20	0.08
8	(2	(20	50	(2	50	0.12
9	2	20	80	(2	590	0.41
90	2	30	70	(2	260	0.22
1*	5	30	40	(2	140	0.16
2	2	20	50	(2	110	0.10
3	(2	20	45	(2	170	0.18
4	(2	20	50	(2	100	0.11
5	(2	20	30	(2	100	0.11
6	(2	20	25	(2	130	0.08
~~6**~~	~~(2~~	~~20~~	~~25~~	~~(2~~	~~140~~	~~0.08~~
7	2	30	70	(2	180	0.60
KD 2098	(2	30	30	(2	80	0.13

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2099	10	90	280	(2	7200	6.90
100	(2	20	20	(2	100	0.10
1	(2	(20	25	(2	20	0.04
2	(2	(20	15	(2	20	0.04
3	(2	20	10	(2	5	0.02
4	(2	20	10	(2	20	0.02
5	(2	20	10	(2	10	0.02
6	(2	(20	30	(2	(5	0.03
7	(2	20	25	(2	40	0.05
8	(2	20	20	(2	70	0.07
9	(2	20	20	(2	20	0.05
10	(2	20	20	(2	20	0.04
1	(2	20	20	(2	10	0.03
2	(2	20	15	(2	30	0.04
3	(2	40	20	(2	10	0.01
4	(2	40	15	(2	5	0.03
5	(2	20	10	(2	5	0.01
6	(2	20	10	(2	(5	0.01
7	(2	20	15	(2	10	0.02
8	(2	(20	15	(2	(5	0.09
9	(2	(20	10	(2	10	0.01
20	(2	(20	15	(2	10	0.02
1	(2	(20	15	(2	(5	0.01
2*	(2	(20	15	(2	(5	0.02
~~2**~~	~~(2~~	~~(20~~	~~10~~	~~(2~~	~~5~~	~~0.02~~
3	(2	(20	10	(2	(5	0.01
4	(2	(20	20	(2	10	0.02
5	(2	(20	15	(2	(5	0.02
6	(2	(20	15	(2	10	0.02
7	(2	(20	30	(2	5	0.02
8	(2	(20	15	(2	(5	0.02
9	(2	20	20	(2	(5	0.05
30	(2	20	20	(2	10	0.02
1	(2	(20	40	(2	20	0.02
2	(2	20	20	(2	(5	0.02
3*	(2	(20	15	(2	5	0.02
4	(2	(20	15	(2	5	0.02
5	(2	20	15	(2	10	0.02
6	(2	20	20	(2	(5	0.02
7	(2	(20	20	(2	(5	0.02
8	(2	(20	15	(2	(5	0.01
9	(2	(20	15	(2	10	0.02
40	(2	(20	20	(2	(5	0.01
1	2	20	30	(2	10	0.03
2	5	20	35	(2	5	0.02
3	(2	(20	30	(2	(5	0.02
4*	(2	(20	30	(2	5	0.01
5	(2	20	35	(2	(5	0.01
6	(2	(20	25	(2	(5	0.01
7	(2	(20	10	(2	(5	0.01
8	10	20	30	(2	(5	0.04
9	(2	(20	20	(2	5	0.02
50	(2	20	30	(2	(5	0.03
KD 2151	2	50	60	(2	70	0.09

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2152	15	30	45	(2	60	0.13
3	(2	20	25	(2	20	0.06
~~3**~~	~~2~~	~~(20~~	~~20~~	~~(2~~	~~20~~	~~0.08~~
4	15	20	40	(2	90	0.12
5	(2	20	25	(2	50	0.06
6	(2	20	30	(2	40	0.04
7	(2	(20	65	(2	(5	0.01
8	(2	20	20	(2	20	0.04
9	(2	20	20	(2	20	0.03
60	(2	20	20	(2	40	0.04
1*	(2	20	30	(2	40	0.03
2	(2	20	20	(2	30	0.03
3	(2	(20	15	(2	20	0.03
4	(2	20	30	(2	20	0.03
5	(2	20	15	(2	20	0.03
6	(2	20	25	(2	5	0.02
7	5	40	140	(2	1800	2.95
8	2	20	45	(2	40	0.10
9	(2	20	60	(2	20	0.04
70	(2	20	40	(2	70	0.09
1*	(2	20	55	(2	70	0.09
2	(2	20	20	(2	(5	0.02
3	(2	20	30	(2	20	0.04
4	(2	(20	50	(2	10	0.02
5	(2	20	40	(2	30	0.05
6	(2	20	15	(2	10	0.04
7	(2	20	20	(2	(5	0.02
8	(2	20	20	(2	10	0.03
9	(2	20	10	(2	20	0.02
80	(2	20	15	(2	10	0.03
1*	(2	20	15	(2	40	0.03
2	(2	20	20	(2	10	0.05
3	(2	20	35	(2	10	0.02
4	(2	20	90	(2	5	0.03
5	(2	20	25	(2	40	0.03
6	(2	30	30	(2	60	0.07
~~6**~~	~~(2~~	~~20~~	~~25~~	~~(2~~	~~60~~	~~0.09~~
7	(2	20	20	(2	(5	0.04
8	(2	30	30	(2	510	0.14
9	(2	20	20	(2	40	0.05
90	(2	30	30	(2	80	0.06
1*	(2	20	20	(2	50	0.05
2	(2	20	20	(2	80	0.04
3	(2	20	25	(2	90	0.06
4	(2	20	25	(2	80	0.06
5	(2	20	25	(2	60	0.08
6	(2	(20	20	(2	50	0.05
7	(2	(20	25	(2	110	0.08
~~7**~~	~~2~~	~~(20~~	~~20~~	~~(2~~	~~100~~	~~0.08~~
8	(2	(20	20	(2	50	0.08
9	(2	(20	30	(2	50	0.17
200	(2	20	20	(2	40	0.11
1	(2	20	30	(2	60	0.14
KD 2202	(2	(20	25	(2	60	0.16

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2203	(2	(20	25	(2	20	0.07
4	5	30	30	(2	30	0.12
5	(2	20	20	(2	5	0.05
6	(2	(20	20	(2	10	0.07
7	2	(20	15	(2	10	0.09
8	2	(20	15	(2	10	0.06
9	5	70	40	(2	340	0.16
10	2	20	20	(2	50	0.08
1*	2	20	20	(2	110	0.13
2	(2	20	25	(2	80	0.08
3	(2	20	25	(2	140	0.11
4	(2	20	30	(2	80	0.09
5	2	30	50	(2	280	0.13
6	10	20	35	(2	190	0.13
7	40	60	60	(2	1220	0.60
8	5	50	95	(2	680	0.18
9	5	30	70	(2	340	0.14
20	2	40	50	(2	230	0.12
1*	(2	30	35	(2	210	0.10
2	2	30	65	(2	300	0.14
3	10	50	45	(2	1100	0.29
4	5	40	60	(2	470	0.17
5	(2	80	90	(2	460	0.26
6	(2	50	40	(2	140	0.21
7	(2	50	80	(2	310	0.36
8	(2	(20	25	(2	40	0.04
9	(2	40	50	(2	360	0.14
30	(2	40	40	(2	230	0.10
1*	(2	30	40	(2	270	0.13
2	(2	20	20	(2	50	0.05
3	(2	20	20	(2	100	0.08
4	2	50	45	(2	190	0.12
5	(2	20	20	(2	10	0.04
~~5**~~	~~(2~~	~~(20~~	~~10~~	~~(2~~	~~5~~	~~0.05~~
6	(2	(20	10	(2	10	0.04
7	5	(20	15	(2	5	0.02
8	(2	(20	15	(2	240	0.10
9	10	(20	35	(2	180	0.10
40	(2	(20	20	(2	(5	0.02
1*	(2	(20	20	(2	5	0.02
2	5	(20	10	(2	(5	0.04
3	(2	(20	20	(2	20	0.04
4	10	(20	20	(2	10	0.03
5	(2	(20	10	(2	5	0.02
6	(2	(20	15	(2	10	0.03
7	(2	(20	10	(2	(5	0.02
8	(2	(20	10	(2	10	0.04
9	(2	(20	10	(2	10	0.03
50	(2	(20	15	(2	20	0.06
~~50**~~	~~5~~	~~(20~~	~~20~~	~~(2~~	~~30~~	~~0.07~~
1	(2	(20	10	(2	20	0.06
2	(2	(20	20	(2	10	0.03
3	(2	(20	10	(2	(5	0.02
4	(2	(20	10	(2	10	0.03
KD 2255	(2	(20	15	(2	10	0.02

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2256	(2	(20	15	(2	(5	0.02
7	(2	(20	10	(2	(5	0.02
8	(2	(20	10	(2	(5	0.02
9	(2	(20	15	(2	10	0.12
60	(2	(20	10	(2	(5	0.04
~~60**~~	~~2~~	~~(20~~	~~15~~	~~(2~~	~~(5~~	~~0.04~~
1*	(2	(20	10	(2	10	0.05
2	(2	(20	10	(2	20	0.05
3	(2	(20	20	(2	10	0.05
4	(2	(20	10	(2	5	0.07
5	(2	(20	20	(2	40	0.14
6	(2	(20	40	(2	40	0.05
7	5	(20	10	(2	10	0.06
8	2	(20	10	(2	30	0.05
9	(2	(20	10	(2	(5	0.05
70	(2	(20	15	(2	30	0.14
1*	(2	(20	15	(2	10	0.13
2	(2	(20	30	(2	5	0.10
3	(2	(20	20	(2	80	0.10
4	(2	(20	10	(2	10	0.02
5	(2	(20	10	(2	30	0.04
6	(2	(20	20	(2	20	0.02
7	(2	(20	10	(2	(5	0.02
8	(2	(20	45	(2	10	0.06
9	(2	(20	20	(2	60	0.08
80	(2	30	20	(2	140	0.07
1*	(2	(20	20	(2	170	0.08
2	2	20	30	(2	80	0.07
3	(2	20	10	(2	20	0.05
4	(2	(20	10	(2	5	0.03
5	(2	(20	15	(2	40	0.05
6	(2	(20	10	(2	60	0.05
7	(2	(20	10	(2	40	0.02
8	(2	(20	10	(2	(5	0.02
9	(2	(20	15	(2	(5	0.02
~~9**~~	~~2~~	~~(20~~	~~10~~	~~(2~~	~~(5~~	~~0.01~~
90	(2	(20	10	(2	5	0.02
1*	(2	(20	10	(2	(5	0.02
2	(2	(20	10	(2	50	0.05
3	(2	(20	10	(2	60	0.04
4	(2	(20	10	(2	60	0.05
5	(2	(20	10	(2	70	0.07
6	(2	(20	15	(2	50	0.05
7	(2	20	20	(2	70	0.36
8	5	20	20	(2	60	0.12
9	15	20	15	(2	40	0.19
300	5	20	15	(2	120	0.13
1	(2	20	15	(2	30	0.07
2	(2	20	15	(2	30	0.07
3	(2	20	25	(2	20	0.08
4	(2	20	15	(2	20	0.12
5	(2	(20	20	(2	10	0.04
6	(2	(20	25	(2	10	0.09
KD 2307	(2	(20	15	(2	10	0.03

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2308	(2	(20	15	(2	20	0.08
9	(2	20	20	(2	40	0.13
10*	(2	20	15	(2	50	0.22
1	(2	(20	20	(2	20	0.18
2	(2	(20	10	(2	20	0.04
3	(2	20	15	(2	30	0.12
4	2	20	10	(2	70	0.13
5	(2	20	20	(2	70	0.22
6	(2	20	15	(2	70	0.43
7	(2	20	20	(2	40	0.09
8	(2	(20	20	(2	40	0.08
9	(2	20	10	(2	90	0.20
20	(2	20	10	(2	40	0.08
1*	(2	(20	15	(2	40	0.10
2	(2	20	10	(2	50	0.10
3	(2	20	10	(2	40	0.08
4	(2	40	10	(2	30	0.04
5	(2	20	20	(2	60	0.22
6	(2	(20	10	(2	10	0.02
7	(2	(20	5	(2	(5	0.02
8	(2	(20	15	(2	5	0.04
9	(2	(20	15	(2	30	0.03
30	2	20	30	(2	160	0.75
1	5	20	20	(2	310	0.20
2*	5	20	20	(2	340	0.21
3	2	(20	20	(2	220	0.18
4	(2	20	20	(2	140	0.11
5	2	20	30	(2	260	0.12
6	(2	20	20	(2	220	0.13
7	2	20	10	(2	90	0.09
8	(2	(20	20	(2	110	0.08
9	5	20	20	(2	190	0.16
40	2	(20	10	(2	140	0.10
1	2	20	25	(2	80	0.24
2	2	20	35	(2	290	0.12
3*	(2	(20	40	(2	350	0.14
4	(2	20	45	(2	390	0.12
5	2	20	50	(2	560	0.14
6	(2	20	25	(2	150	0.10
~~6**~~	~~(2~~	~~20~~	~~25~~	~~(2~~	~~140~~	~~0.10~~
7	(2	20	15	(2	170	0.14
8	(2	20	15	(2	220	0.14
9	(2	20	20	(2	30	0.25
50	2	20	10	(2	5	0.02
1	2	(20	10	(2	5	0.02
2	(2	(20	20	(2	(5	0.02
3	2	(20	10	(2	(5	0.02
4	2	20	10	(2	20	0.32
5*	(2	(20	15	(2	(5	0.17
6	(2	(20	10	(2	(5	0.02
7	(2	(20	10	(2	5	0.02
8	(2	(20	15	(2	5	0.01
9	(2	(20	40	(2	(5	0.02
KD 2360	(2	(20	10	(2	5	0.02

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2361	(2	(20	30	(2	(5	0.02
2	(2	(20	15	(2	20	0.11
~~2**~~	~~2~~	~~(20~~	~~10~~	~~(2~~	~~20~~	~~0.10~~
3	(2	(20	15	(2	10	0.02
4	(2	(20	10	(2	5	0.02
5	(2	(20	10	(2	5	0.04
6*	(2	(20	10	(2	(5	0.04
7	(2	20	10	(2	10	0.03
8	5	40	20	(2	20	0.05
9	2	(20	20	(2	20	0.06
70	(2	(20	10	(2	20	0.08
1	(2	(20	10	(2	10	0.07
2	(2	(20	15	(2	5	0.03
3	(2	(20	10	(2	10	0.06
4	(2	(20	15	(2	20	0.05
5	(2	(20	10	(2	20	0.04
6	(2	(20	20	(2	20	0.04
7*	(2	(20	10	(2	10	0.03
8	(2	(20	15	(2	10	0.03
9	(2	(20	15	(2	20	0.04
80	(2	(20	25	(2	20	0.05
1	(2	20	10	(2	10	0.07
2	(2	40	20	(2	30	0.11
3	2	(20	20	(2	10	0.07
4	(2	(20	20	(2	20	0.12
5	(2	(20	20	(2	20	0.14
~~5**~~	~~(2~~	~~(20~~	~~15~~	~~(2~~	~~20~~	~~0.14~~
6	(2	(20	10	(2	20	0.04
7	(2	20	10	(2	30	0.13
8*	(2	(20	10	(2	30	0.09
9	2	(20	20	(2	20	0.07
90	5	20	20	(2	20	0.13
1	(2	20	10	(2	30	0.12
2	(2	(20	10	(2	30	0.07
3	(2	(20	10	(2	20	0.05
4	(2	(20	10	(2	20	0.13
5	(2	(20	10	(2	10	0.03
6	(2	(20	10	(2	20	0.04
7	(2	20	10	(2	20	0.04
8	(2	(20	10	(2	10	0.08
9*	(2	(20	15	(2	20	0.12
400	(2	(20	10	(2	10	0.04
1	2	(20	10	(2	5	0.04
2	(2	(20	10	(2	(5	0.17
3	(2	(20	10	(2	20	0.04
4	(2	(20	10	(2	20	0.02
5	(2	(20	20	(2	10	0.06
6*	(2	(20	20	(2	(5	0.05
7	(2	(20	15	(2	10	0.02
8	10	20	25	(2	20	0.20
9	(2	(20	15	(2	20	0.04
10	(2	(20	10	(2	20	0.03
~~10**~~	~~(2~~	~~(20~~	~~10~~	~~(2~~	~~20~~	~~0.03~~
KD 2411	(2	(20	10	(2	(5	0.02

* Denotes duplicate of previous sample

** Denotes repeat and check

(Denotes less than

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2412	(2	(20	10	(2	10	0.02
3	(2	(20	20	(2	(5	0.02
4	(2	(20	10	(2	5	0.02
5	(2	(20	10	(2	30	0.04
6	2	(20	10	(2	40	0.04
7	5	(20	10	(2	20	0.06
8*	2	(20	10	(2	5	0.06
9	(2	(20	15	(2	10	0.05
20	(2	(20	20	(2	20	0.03
1	(2	(20	10	(2	30	0.03
2	(2	(20	10	(2	10	0.03
3	(2	(20	20	(2	40	0.05
4	(2	(20	15	(2	(5	0.06
5	(2	(20	30	(2	20	0.04
6	(2	(20	15	(2	20	0.03
7	5	(20	20	(2	20	0.12
8	(2	(20	20	(2	20	0.03
9*	(2	(20	25	(2	5	0.04
9**	(2	(20	20	(2	(5	0.04
30	5	(20	30	(2	20	0.05
1	(2	(20	15	(2	5	0.03
2	(2	(20	10	(2	10	0.04
3	(2	(20	10	(2	10	0.03
4	2	(20	15	(2	5	0.07
5	(2	(20	15	(2	10	0.04
6	5	(20	20	(2	80	0.07
7	(2	(20	10	(2	20	0.02
8	(2	(20	20	(2	10	0.02
9	(2	(20	15	(2	40	0.05
40	(2	(20	20	(2	20	0.02
1*	(2	(20	10	(2	10	0.02
2	(2	(20	10	(2	30	0.03
3	(2	(20	20	(2	20	0.14
4	(2	(20	10	(2	(5	0.03
5	(2	(20	15	(2	40	0.08
6	(2	(20	10	(2	20	0.03
7	(2	(20	20	(2	20	0.05
8	(2	(20	10	(2	10	0.02
9	(2	(20	10	(2	5	0.08
50	(2	(20	20	(2	20	0.04
1	(2	(20	20	(2	20	0.06
2*	(2	(20	15	(2	20	0.05
3	(2	(20	10	(2	20	0.03
4	(2	(20	10	(2	40	0.04
5	(2	(20	10	(2	20	0.04
6	(2	20	20	(2	20	0.05
7	(2	20	20	(2	20	0.10
8	(2	(20	15	(2	10	0.05
9	(2	(20	15	(2	10	0.05
60	(2	20	15	(2	10	0.08
1	(2	(20	15	(2	20	0.05
2	(2	(20	20	(2	20	0.05
3	(2	(20	10	(2	30	0.03
4	(2	(20	10	(2	20	0.04
KD 2464**	(2	(20	10	(2	20	0.04

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2465	(2	(20	15	(2	20	0.03
6	(2	(20	10	(2	20	0.03
7*	(2	(20	10	(2	20	0.03
8	(2	(20	10	(2	5	0.04
9	(2	(20	10	(2	10	0.07
70	5	30	40	(2	320	0.30
1	2	20	40	(2	220	0.24
2	(2	(20	20	(2	60	0.04
3	(2	(20	30	(2	60	0.04
4	(2	(20	20	(2	40	0.06
5	(2	(20	10	(2	50	0.03
6	(2	(20	10	(2	40	0.06
~~6**~~	~~(2~~	~~(20~~	~~10~~	~~(2~~	~~30~~	~~0.06~~
7	(2	(20	10	(2	5	0.02
8	(2	(20	10	(2	(5	0.06
9*	(2	(20	10	(2	10	0.05
80	(2	(20	10	(2	10	0.01
1	(2	(20	10	(2	(5	0.01
2	(2	(20	10	(2	10	0.05
3	5	(20	10	(2	(5	0.02
4	5	(20	10	(2	(5	0.05
5	2	20	10	(2	5	0.02
6	10	(20	15	(2	10	0.20
7	5	(20	15	(2	40	0.38
8	20	(20	15	(2	20	0.11
9	2	(20	10	(2	5	0.04
90*	2	(20	10	(2	10	0.04
1	2	(20	15	(2	20	0.14
2	(2	(20	10	(2	10	0.05
3	(2	(20	10	(2	(5	0.02
4	(2	(20	10	(2	20	0.06
5	(2	(20	15	(2	30	0.04
6	(2	(20	15	(2	10	0.08
7	(2	20	10	(2	20	0.09
~~7**~~	~~(2~~	~~20~~	~~10~~	~~(2~~	~~20~~	~~0.08~~
8	(2	20	20	(2	10	0.06
9	(2	(20	15	(2	20	0.09
2500	(2	(20	15	(2	(5	0.04
2501*	2	20	15	(2	20	0.05
2	(2	20	10	(2	20	0.05
3	2	(20	10	(2	20	0.10
4	(2	20	10	(2	10	0.04
5	(2	30	10	(2	120	0.14
6	(2	40	25	(2	70	0.12
7	(2	(20	5	(2	40	0.05
8	(2	(20	10	(2	30	0.06
9	(2	(20	20	(2	40	0.06
10	2	100	50	(2	2560	1.00
1	(2	20	20	(2	160	0.11
2	(2	50	60	(2	660	0.20
3	(2	40	15	(2	60	0.14
4	(2	(20	20	(2	5	0.03
5	(2	(20	10	(2	5	0.02
KD 2516	(2	(20	10	(2	(5	0.02

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2517	2	20	20	(2	10	0.06
8	(2	(20	20	(2	10	0.06
9	(2	(20	10	(2	10	0.02
20	(2	(20	10	(2	(5	0.04
1	(2	20	10	(2	(5	0.03
2	(2	20	20	(2	(5	0.04
3	(2	(20	10	(2	5	0.03
4**	(2	(20	20	(2	10	0.04
~~4~~	~~(2~~	~~(20~~	~~15~~	~~(2~~	~~10~~	~~0.04~~
5	(2	20	10	(2	5	0.03
6	(2	(20	30	(2	10	0.03
7	(2	(20	15	(2	20	0.04
8	2	20	5	(2	10	0.15
9*	(2	(20	5	(2	10	0.07
30	(2	20	10	(2	5	0.02
1	(2	20	15	(2	(5	0.03
2	(2	(20	10	(2	5	0.04
3	(2	(20	5	(2	5	0.02
4	(2	(20	10	(2	5	0.02
5	(2	(20	15	(2	5	0.04
6	(2	(20	15	(2	5	0.02
7	(2	(20	15	(2	(5	0.04
8	2	(20	20	(2	5	0.04
9	2	(20	10	(2	(5	0.05
40	(2	20	5	(2	5	0.06
1*	(2	20	15	(2	5	0.04
2	(2	(20	20	(2	5	0.06
3	2	(20	40	(2	5	0.06
4	(2	(20	10	(2	(5	0.02
5	(2	(20	10	(2	(5	0.06
6	(2	20	20	(2	40	0.12
7	5	(20	20	(2	(5	0.03
8	(5	(20	15	(2	40	0.14
9	10	20	20	(2	20	0.03
50	2	20	10	(2	20	0.10
1	5	20	20	(2	130	0.23
2	5	(20	20	(2	260	0.10
3	2	(20	20	(2	350	0.08
4	2	(20	30	(2	190	0.09
5	(2	(20	20	(2	100	0.06
6	5	20	30	(2	90	0.10
7	(2	(20	15	(2	140	0.08
8	2	20	30	(2	60	0.14
9	2	(20	25	(2	40	0.27
60	(2	20	30	(2	540	2.20
1*	5	30	50	(2	630	2.75
2	2	20	30	(2	370	1.25
3	5	20	20	(2	40	0.95
4	2	20	30	(2	250	1.20
5	10	20	30	(2	350	1.85
6**	(2	(20	5	(2	10	0.16
~~6~~	~~(2~~	~~20~~	~~10~~	~~(2~~	~~5~~	~~0.16~~
KD 2567	(2	(20	10	(2	5	0.02

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2568	(2	(20	10	(2	(5	0.06
9	(2	20	25	(2	40	0.09
70	(2	(20	20	(2	70	0.11
1*	(2	20	20	(2	60	0.10
2	(2	20	20	(2	80	0.07
3	(2	20	15	(2	110	0.16
4	(2	20	15	(2	220	0.60
5	(2	(20	25	(2	60	0.18
6	2	20	10	(2	200	0.12
7	(2	20	20	(2	40	0.10
8	2	20	20	(2	100	0.12
9	(2	20	40	(2	190	0.13
80	(2	(20	15	(2	20	0.06
1*	2	20	10	(2	20	0.07
2	(2	(20	10	(2	20	0.06
3	(2	(20	10	(2	40	0.06
4	(2	20	20	(2	20	0.05
5	(2	20	15	(2	130	0.28
6	2	20	10	(2	60	0.12
7	2	20	90	(2	60	0.06
8	(2	20	20	(2	70	0.07
9	(2	20	15	(2	60	0.10
90	(2	20	30	(2	150	0.12
1*	2	20	20	(2	120	0.15
2	(2	(20	25	(2	220	0.11
3	2	(20	25	(2	150	0.09
4	(2	20	10	(2	140	0.09
5	(2	(20	15	(2	80	0.05
6	2	(20	10	(2	100	0.08
7	(2	20	10	(2	150	0.20
8	(2	(20	30	(2	70	0.08
9	5	20	20	(2	50	0.22
2600	(2	20	15	(2	40	0.08
1*	(2	20	25	(2	30	0.07
2	(2	(20	15	(2	60	0.14
3	(2	(20	10	(2	20	0.04
4	(2	(20	10	(2	20	0.06
5	(2	(20	10	(2	10	0.04
6	(2	(20	10	(2	5	0.04
7	(2	(20	20	(2	5	0.02
8	(2	20	20	(2	5	0.05
9	(2	(20	15	(2	5	0.02
10**	(2	20	15	(2	5	0.04
~~10~~	~~(2~~	~~30~~	~~15~~	~~(2~~	~~10~~	~~0.04~~
1*	(2	20	5	(2	10	0.02
2	(2	20	15	(2	50	0.08
3	(2	20	20	(2	20	0.08
4	(2	(20	20	(2	40	0.09
5	(2	(20	25	(2	30	0.04
6	(2	30	10	(2	(5	0.01
7	(2	20	10	(2	(5	0.03
8	(2	30	20	(2	5	0.02
9	(2	30	10	(2	5	0.02
20	(2	50	15	2	(5	0.02
KD 2621*	(2	40	5	2	(5	0.02

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2622	(2	20	10	(2	(5	0.01
3	(2	40	5	(2	(5	0.01
4	(2	20	5	(2	(5	0.01
5	(2	40	5	(2	(5	0.02
6	(2	50	15	(2	(5	0.04
7	2	30	10	(2	(5	0.01
8	(2	30	10	(2	(5	0.01
9	2	30	10	(2	(5	0.03
30	2	40	5	(2	(5	0.01
1*	(2	20	15	(2	(5	0.02
2	(2	40	10	(2	(5	0.02
3	2	30	10	(2	5	0.02
4	2	20	10	(2	(5	0.02
5	2	30	10	(2	5	0.02
6	(2	30	15	(2	(5	0.02
7**	(2	20	10	(2	(5	0.03
~~7~~	~~(2~~	~~30~~	~~15~~	~~(2~~	~~(5~~	~~0.04~~
8	(2	50	5	(2	(5	0.03
9	5	20	10	(2	70	0.51
40	2	40	20	(2	90	0.30
1*	5	70	30	(2	90	0.29
2	(2	60	20	(2	80	0.49
3	(2	30	15	(2	40	0.18
4	5	30	20	(2	20	0.08
5	5	20	10	(2	20	0.20
6	(2	40	15	(2	15	0.06
7	(2	50	10	(2	20	0.08
8	(2	30	10	(2	10	0.07
9	(2	20	15	(2	10	0.07
50	2	30	5	(2	20	0.09
1	(2	20	10	(2	110	0.85
2	(2	(20	10	(2	10	0.06
3	(2	(20	15	(2	30	0.12
4*	(2	(20	20	(2	5	0.04
5	(2	(20	20	(2	5	0.04
6	(2	(20	10	(2	5	0.06
7	(2	20	20	(2	60	0.24
8	(2	40	30	(2	80	0.70
9**	2	20	10	(2	20	0.13
~~9~~	~~(2~~	~~20~~	~~10~~	~~(2~~	~~20~~	~~0.12~~
60	(2	(20	10	(2	30	0.06
1	(2	20	20	(2	20	0.14
2	(2	20	20	(2	20	0.08
3	(2	(20	10	(2	30	0.06
4	(2	20	20	(2	20	0.04
5*	2	20	10	(2	20	0.05
6	(2	(20	15	(2	10	0.03
7	(2	20	10	(2	20	0.07
8	(2	20	20	(2	20	0.08
9	(2	(20	20	(2	20	0.06
70	2	(20	15	(2	30	0.05
1	2	(20	10	(2	30	0.10
2	(2	20	35	(2	30	0.15
3	(2	(20	10	(2	20	0.04
KD 2674	(2	20	30	(2	50	0.30

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2675	(2	20	20	(2	20	0.08
6*	(2	20	20	(2	40	0.10
7	(2	15	(20	(2	10	0.04
8	2	20	20	(2	20	0.03
9	(2	20	10	(2	30	0.07
80	(2	(20	10	(2	30	0.04
1	(2	20	15	(2	40	0.12
2	(2	20	15	(2	40	0.14
3	2	20	15	(2	50	0.11
4	(2	20	20	(2	50	0.15
5	2	(20	30	(2	50	0.19
6	2	20	20	(2	50	0.16
7**	(2	20	20	(2	60	0.18
~~7~~	~~(2~~	~~20~~	~~20~~	~~(2~~	~~60~~	~~0.18~~
8	(2	20	20	(2	60	0.22
9	(2	20	20	(2	40	0.07
90	(2	20	20	(2	50	0.17
1	(2	20	15	(2	60	0.28
2	5	20	15	(2	230	1.20
3	5	30	65	(2	360	1.60
4	5	30	20	(2	80	0.90
5	(2	(20	15	(2	50	0.39
6	(2	20	30	(2	50	0.26
7	2	20	40	(2	190	1.05
8*	(2	20	35	(2	150	1.00
9	(2	20	40	(2	230	1.30
700	(2	30	30	(2	150	0.75
1	5	30	40	(2	240	1.25
2	(2	(20	15	(2	10	0.05
3	(2	20	35	(2	160	0.80
4	(2	(20	20	(2	50	0.14
5	(2	30	35	(2	530	1.35
6	(2	20	20	(2	250	0.85
7	(2	20	25	(2	20	0.13
8	5	(20	20	(2	5	0.04
9*	2	(20	10	(2	5	0.04
10	(2	20	20	(2	30	0.11
1	(2	40	30	(2	40	0.15
2	(2	30.	25	(2	60	0.26
3	(2	(20	10	(2	10	0.04
4	2	40	25	(2	80	0.31
5	2	20	10	(2	20	0.04
6	(2	30	30	(2	100	0.35
7	(2	(20	20	(2	5	0.02
8	2	30	45	(2	210	1.05
9	(2	20	40	(2	130	0.70
20	(2	40	40	(2	140	0.75
1	(2	70	15	(2	30	0.08
2	(2	30	20	(2	10	0.04
3	(2	40	20	(2	10	0.09
4	(2	20	25	(2	(5	0.05
5	(2	40	10	(2	10	0.11
6	(2	30	20	(2	(5	0.06
7	(2	50	20	(2	20	0.21
8	(2	20	15	(2	30	0.06
KD 2729	2	20	25	(2	5	0.08

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2730	(2	50	15	(2	10	0.07
1*	(2	30	15	2	15	0.11
2	2	30	20	2	20	0.15
3	2	30	20	(2	30	0.09
4	5	40	15	(2	20	0.06
5	5	30	15	(2	20	0.51
6	(2	20	20	(2	30	0.72
7	(2	40	15	(2	10	0.17
8	(2	50	15	(2	5	0.03
9	(2	30	20	(2	(5	0.09
40	(2	40	10	(2	(5	0.05
1	(2	40	15	(2	40	0.11
2*	(2	30	25	(2	30	0.09
3	5	20	15	(2	40	0.17
4	2	40	35	(2	20	0.06
5	2	40	25	(2	40	0.16
6	5	30	20	(2	40	0.12
7	(2	40	20	(2	20	0.05
8	(2	30	15	(2	40	0.11
9	(2	60	10	(2	20	0.06
50	(2	20	10	(2	10	0.02
1	5	40	25	(2	30	0.11
2	2	40	20	(2	50	0.33
3*	(2	50	65	(2	60	0.31
4	5	50	45	(2	30	0.20
5	5	30	95	(2	20	0.12
6	(2	40	30	(2	5	0.04
7	5	40	120	(2	130	0.16
8	2	40	35	(2	80	0.26
9	2	30	20	(2	50	0.17
60	5	50	45	(2	870	0.87
1	5	30	20	(2	20	0.15
2	(2	70	40	(2	1050	0.98
3	(2	20	30	(2	110	0.26
4*	2	40	25	(2	140	0.42
5	(2	60	20	(2	40	0.06
6**	5	60	30	(2	110	0.49
~~6~~	~~2~~	~~70~~	~~30~~	~~(2~~	~~100~~	~~0.47~~
7	(2	40	30	(2	80	0.10
8	2	40	35	(2	90	0.49
9	(2	20	40	(2	(5	0.02
70	2	30	35	(2	260	0.59
1	5	20	20	(2	110	0.30
2	2	20	45	(2	200	0.17
3	2	40	50	(2	270	0.15
4	5	30	45	(2	100	0.24
5*	5	30	50	(2	100	0.34
6	2	20	35	(2	120	0.25
7	2	30	45	(2	190	0.22
8	5	20	40	(2	110	0.26
9	5	30	30	(2	100	0.20
80**	5	30	50	(2	80	0.11
~~80~~	~~5~~	~~30~~	~~40~~	~~(2~~	~~80~~	~~0.10~~
1	10	40	30	(2	280	0.43
KD 2782	2	50	60	(2	230	0.52

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2783	2	30	30	(2	180	0.26
4	2	20	30	(2	120	0.08
5	2	20	30	(2	150	0.10
6*	2	30	35	(2	200	0.10
7	10	20	30	(2	10	0.06
8	5	40	45	(2	30	0.13
9	5	80	65	(2	100	0.48
90	5	30	30	(2	150	0.29
1	5	20	30	(2	80	0.22
2	5	50	30	(2	620	0.42
3	2	30	20	(2	80	0.49
4	5	30	50	(2	50	0.62
5	5	30	35	(2	50	0.69
6	5	20	40	(2	80	0.36
7*	10	40	45	(2	70	0.41
8	5	40	30	(2	190	0.48
9	10	40	35	(2	440	0.69
800	5	30	40	(2	260	0.72
1	2	30	70	(2	20	0.12
2	5	40	20	(2	40	0.09
3	(2	20	20	(2	20	0.04
4**	2	40	35	(2	180	0.72
~~4~~	~~2~~	~~40~~	~~35~~	~~(2~~	~~170~~	~~0.71~~
5	2	30	30	(2	40	0.09
6	(2	50	30	(2	20	0.04
7	(2	50	170	(2	20	0.09
8	(2	30	100	(2	(5	0.04
9	5	30	30	(2	50	0.12
10	(2	40	45	(2	40	0.18
1*	(2	80	40	(2	40	0.21
2	2	40	70	(2	20	0.09
3	2	40	25	(2	50	0.16
4	(2	60	140	(2	200	0.59
5	2	50	20	(2	20	0.09
6	(2	50	15	(2	20	0.11
7	(2	40	5	(2	40	0.07
8	2	40	20	(2	460	0.47
9	10	20	45	(2	100	0.10
20	10	20	25	(2	120	0.12
1*	20	20	25	(2	160	0.14
2	2	20	20	(2	120	0.12
3	5	20	20	(2	110	0.10
4	5	20	20	(2	20	0.05
5	2	20	25	(2	160	0.28
6	5	20	30	(2	160	0.23
7	10	30	40	(2	170	0.48
8	2	20	30	(2	20	0.06
9	2	20	20	(2	30	0.06
30	2	20	20	(2	30	0.05
1*	2	30	30	(2	20	0.05
2	(2	20	20	(2	20	0.05
3	2	20	20	(2	20	0.08
4	2	20	30	(2	50	0.10
KD ~~2834~~	~~2~~	~~(20~~	~~15~~	~~(2~~	~~100~~	~~0.12~~

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2835	2	(20	15	(2	100	0.12
6	2	20	15	(2	30	0.08
7	2	(20	10	(2	20	0.07
8	2	(20	10	(2	30	0.06
9	5	20	15	(2	10	0.03
40	2	20	20	(2	(5	0.02
1*	2	20	20	(2	(5	0.02
2	2	20	15	(2	(5	0.03
3	2	(20	15	(2	20	0.09
4	2	20	20	(2	30	0.08
5	2	(20	20	(2	30	0.17
6	(2	(20	15	(2	30	0.06
7	10	30	20	(2	20	0.11
8	5	20	15	(2	40	0.06
9	20	30	40	(2	160	0.21
50	2	20	20	(2	40	0.06
1	(2	30	30	(2	30	0.07
2	(2	30	30	(2	30	0.07
3	(2	30	20	(2	40	0.17
4	(2	20	20	(2	40	0.10
5	(2	50	15	(2	160	0.09
6	5	40	30	(2	480	0.63
7	(2	70	15	(2	20	0.06
8	2	60	15	(2	80	0.11
9	(2	50	20	(2	50	0.09
60	2	40	10	(2	30	0.08
1*	2	70	10	(2	30	0.08
2	2	40	15	(2	20	0.04
3	2	30	15	(2	30	0.08
4	5	30	20	(2	20	0.15
5	5	30	15	(2	20	0.08
6	5	30	15	(2	5	0.02
7	5	40	15	(2	20	0.09
8	5	40	20	(2	20	0.06
9	(2	60	10	(2	20	0.12
70	2	40	15	(2	20	0.04
1*	(2	60	10	(2	10	0.06
2	(2	50	10	(2	5	0.06
3	(2	30	10	(2	5	0.04
4	(2	40	10	(2	10	0.04
5	(2	40	15	(2	15	0.07
6	(2	40	15	(2	5	0.04
7	(2	20	15	(2	(5	0.01
8	(2	20	45	(2	10	0.02
9	2	40	80	(2	460	0.23
80	2	40	70	(2	890	0.41
1*	5	40	50	(2	500	0.35
2	(2	20	25	(2	40	0.08
3	2	20	40	(2	230	0.19
4	5	20	30	(2	180	0.13
5	2	20	20	(2	70	0.12
6	2	20	20	(2	30	0.09
7	5	(20	15	(2	30	0.09
8	5	20	30	(2	70	0.16
KD 2889	2	20	20	(2	20	0.05

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 2890	5	(20	30	(2	60	0.20
1*	2	(20	15	(2	50	0.19
2	2	(20	30	(2	30	0.07
3	20	30	70	(2	40	0.54
4	2	30	35	(2	30	0.09
5	2	20	30	(2	190	0.28
6	2	20	30	(2	180	0.80
7	(2	20	25	(2	120	0.22
8	(2	20	20	(2	30	0.10
9	(2	(20	15	(2	20	0.04
900	2	(20	15	(2	50	0.08
1*	2	(20	20	(2	60	0.08
2	2	(20	20	(2	20	0.04
3	5	(20	20	(2	20	0.03
4	(2	20	35	(2	10	0.03
5	5	20	30	(2	20	0.02
6	2	20	20	(2	30	0.06
7	(2	(20	20	(2	20	0.03
8	5	(20	20	(2	30	0.06
9**	(2	20	20	(2	5	0.01
~~9~~	~~2~~	~~20~~	~~20~~	~~(2~~	~~5~~	~~0.01~~
10	2	(20	15	(2	5	0.03
1*	(2	(20	20	(2	5	0.01
2	2	(20	15	(2	5	0.01
3	5	20	20	(2	10	0.02
4	5	(20	15	(2	20	0.04
5	5	(20	15	(2	20	0.04
KD 2916	5	(20	15	(2	10	0.03
KD 2951	5	20	30	(2	180	0.87
2	5	20	30	(2	80	0.35
3	5	30	50	(2	2850	0.82
4	5	20	25	(2	140	0.72
5	2	20	40	(2	90	0.27
6	5	20	20	(2	100	0.34
7	10	(20	30	(2	80	0.26
8*	5	(20	50	(2	100	0.31
9	5	20	20	(2	80	0.14
60	5	(20	20	(2	60	0.14
1	5	(20	35	(2	50	0.15
2	2	(20	20	(2	40	0.12
3	5	20	40	(2	100	0.35
4	5	30	20	(2	70	0.15
5	5	20	20	(2	70	0.13
KD 2966	10	(20	40	(2	90	0.28
KD 3001	5	(20	20	(2	20	0.05
2	5	(20	25	(2	40	0.08
3	5	(20	30	(2	20	0.04
4	10	(20	25	(2	40	0.08
KD 3005	5	(20	30	(2	40	0.08

* Denotes duplicate of previous sample.

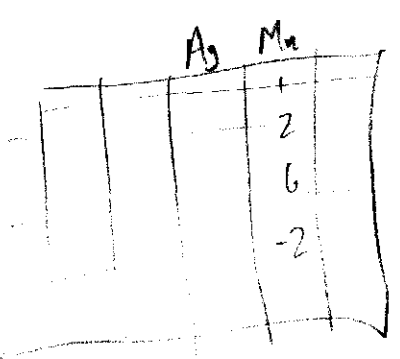
** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KD 3006	5	20	15	(2	30	0.05
7	10	30	60	(2	400	0.35
8	10	60	90	(2	710	1.34
9	15	240	65	(2	3450	0.83
10	5	60	55	(2	370	0.27
1*	20	50	60	(2	340	0.26
2	10	20	15	(2	40	0.06
3**	5	20	40	(2	280	0.34
~~3~~	~~2~~	~~20~~	~~40~~	~~(2~~	~~290~~	~~0.35~~
4	10	30	50	(2	410	0.81
5	10	20	40	(2	250	0.32
6	10	20	35	(2	310	0.22
7	15	30	40	(2	190	0.20
8	5	30	30	(2	270	0.15
9	5	20	30	(2	230	0.16
20	5	30	35	(2	100	0.09
1*	5	20	30	(2	120	0.10
2	10	(20	30	(2	220	0.10
3	2	(20	30	(2	130	0.07
4	2	20	20	(2	110	0.09
5	2	(20	15	(2	20	0.08
6	(2	(20	10	(2	60	0.07
7	(2	20	15	(2	110	0.15
KD 3028	(2	(20	10	(2	30	0.08
Det^n.	2	20	-1	2	5	-1

PREPARATION: Dried and sieved to -80 mesh.

ANALYTICAL METHODS: Cu, Pb, Zn, Ag, Mn and Fe by A.A.S. following HCL leach and HCL/HNO_3 leach for 1 hour in latter stages of 0.25 g sample.



* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

APPENDIX NO. 2

ANALYTICAL RESULTS

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2001	500	50
2	2000	10
3	500	10
4	1000	20
5	1000	10
6	500	10
7	300	10
8	300	10
9	1000	30
10	500	10
1*	300	10
2	300	20
3	100	10
4	100	5
5	1000	5
6	300	10
7	500	30
8	300	10
9	300	5
20	300	10
1	500	30
2	300	10
3	300	30
4	300	5
5	300	5
6	200	10
7	1000	10
8	1000	30
9	500	50
30	500	30
1	1000	30
2	500	10
3*	300	10
4	100	10
5	100	10
6	300	10
7	300	10
8	300	30
9	500	30
40	100	10
1	300	10
2	500	30
3	500	50
4*	500	100
5	500	20
6	500	20
7	1000	30
8	1000	30
KD 2049	500	30

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2050	500	30
1	300	10
2	500	10
3	500	30
4	300	30
5	500	10
6	300	10
7	300	5
8	300	30
9	1000	30
60	300	100
1*	500	20
2	300	30
3	300	30
4	300	30
5	1000	30
6	300	10
7	300	10
8	300	50
9	300	10
70	300	30
1*	300	50
2	300	30
3	300	20
4	300	10
5	300	50
6	200	30
7	200	50
8	200	30
9	200	30
80	100	10
1*	300	30
2	500	30
3	300	10
4	300	10
5	500	30
6	1000	30
7	500	5
8	300	30
9	500	30
90	300	30
1*	300	20
2	300	10
3	500	30
4	300	30
5	500	30
6	300	10
7	1000	30
KD 2098	500	20

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2099	500	100
100	500	30
1	300	10
2	500	30
3	300	10
4	300	5
5	300	3
6	300	5
7	300	10
8	500	30
9	300	10
10	500	10
1	300	10
2	300	10
3	300	10
4	300	5
5	300	5
6	300	5
7	300	10
8	300	10
9	300	10
20	300	5
1	500	3
2*	200	10
3	300	5
4	300	5
5	300	5
6	500	30
7	500	50
8	300	20
9	300	300
30	300	20
1	300	10
2	500	20
3*	500	3
4	300	3
5	300	10
6	300	10
7	200	10
8	100	5
9	300	10
40	300	10
1	300	30
2	1000	40
3	500	5
4*	500	5
5	200	5
6	100	5
7	300	5
8	500	100
9	300	10
50	500	30
1	1000	50
2	1000	50
KD 2153	500	10

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2154	1000	50
5	500	10
6	500	10
7	100	5
8	500	10
9	300	5
60	300	5
1*	500	5
2	500	10
3	500	10
4	300	5
5	300	20
6	300	10
7	500	5
8	1000	30
9	500	30
70	300	50
1*	1000	50
2	1000	10
3	500	50
4	300	30
5	500	50
6	300	50
7	300	10
8	500	30
9	300	10
80	300	10
1*	300	10
2	2000	50
3	300	200
4	300	50
5	1000	50
6	1000	30
7	1000	30
8	1000	30
9	300	20
90	1000	10
1*	2000	10
2	1000	10
3	500	10
4	300	20
5	500	20
6	300	20
7	300	30
8	500	30
9	1000	20
200	1000	20
1	1000	30
2	500	50
3	500	50
4	500	20
5	500	20
6	500	30
7	500	30
KD 2208	500	30

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2208	500	30
9	1000	50
10	500	30
1*	1000	50
2	300	30
3	500	50
4	300	50
5	500	20
6	300	30
7	1000	30
8	300	30
9	500	10
20	1000	10
1*	500	10
2	1000	10
3	2000	10
4	2000	30
5	2000	10
6	500	30
7	1000	10
8	300	10
9	300	10
30	500	30
1*	500	30
2	500	30
3	1000	10
4	500	30
5	500	5
6	300	30
7	300	30
8	300	10
9	1000	10
40	300	10
1*	300	10
2	500	20
3	500	5
4	500	30
5	200	5
6	300	5
7	300	3
8	500	30
9	300	10
50	1000	20
1	1000	10
2	1000	10
3	300	10
4	500	10
5	300	10
6	500	10
7	500	10
8	100	5
9	500	50
60	300	10
1*	300	10
KD 2262	300	10

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2263	300	3
4	300	20
5	300	10
6	300	20
7	1000	30
8	300	30
9	300	10
70	1000	30
1*	1000	30
2	500	30
3	500	30
4	300	30
5	300	5
6	300	5
7	300	5
8	300	5
9	500	5
80	300	10
1*	300	20
2	500	20
3	200	10
4	300	10
5	300	10
6	500	10
7	300	10
8	200	10
9	300	20
90	300	10
1*	300	10
2	500	10
3	300	30
4	300	30
5	500	30
6	500	30
7	500	30
8	500	50
9	1000	30
300	500	30
1	1000	30
2	500	30
3	1000	20
4	1000	10
5	200	10
6	200	5
7	200	10
8	300	20
9	500	20
10*	500	30
1	100	20
2	1000	3
3	200	30
4	500	10
5	500	10
6	500	30
KD 2317	500	50

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2318	500	30
9	500	30
20	300	30
1*	300	30
2	1000	50
3	100	30
4	1000	30
5	100	50
6	100	10
7	500	10
8	200	20
9	200	5
30	300	20
1	200	20
2*	300	20
3	200	20
4	100	20
5	100	10
6	100	5
7	200	5
8	300	10
9	300	30
40	300	10
1	500	30
2	300	30
3*	300	20
4	200	20
5	300	30
6	300	30
7	300	30
8	300	30
9	500	10
50	300	10
1	300	30
2	300	20
3	300	30
4	300	30
5*	300	30
6	300	30
7	200	50
8	300	20
9	300	30
60	300	10
1	300	3
2	500	50
3	300	30
4	300	20
5	1000	30
6*	500	30
7	300	20
8	500	20
9	1000	20
70	300	20
1	300	10
KD 2372	300	5

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2373	1000	5
4	1000	50
5	500	3
6	300	10
7*	300	20
8	300	20
9	500	10
80	300	10
1	300	30
2	1000	20
3	1000	5
4	1000	10
5	1000	5
6	500	5
7	1000	10
8*	1000	10
9	500	20
90	1000	3
1	1000	10
2	1000	10
3	500	10
4	500	50
5	300	10
6	500	30
7	300	10
8	200	10
9*	200	10
400	1000	10
1	1000	10
2	500	10
3	1000	20
4	500	10
5	1000	30
6*	1000	20
7	300	3
8	500	20
9	300	3
10	500	10
1	500	5
2	500	5
3	300	20
4	300	5
5	500	5
6	500	10
7	1000	30
8*	1000	20
9	1000	20
20	500	30
1	300	30
2	500	10
3	1000	10
4	1000	10
5	1000	10
6	1000	10
KD 2427	1000	20

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2428	500	10
9*	500	10
30	300	10
1	300	10
2	300	5
3	300	20
4	500	20
5	1000	10
6	1000	5
7	500	10
8	500	10
9	300	3
40	500	10
1*	500	20
2	300	5
3	1000	10
4	1000	10
5	500	20
6	300	10
7	300	5
8	300	10
9	300	5
50	500	5
1	500	20
2*	1000	30
3	500	20
4	500	10
5	500	10
6	500	10
7	500	30
8	2000	30
9	2000	20
60	2000	30
1	500	30
2	500	30
3	1000	10
4	1000	10
5	300	20
6	500	10
7*	300	20
8	300	20
9	2000	10
70	2000	10
1	1000	30
2	300	10
3	300	30
4	1000	10
5	300	20
6	300	10
7	2000	30
8	500	30
9*	2000	10
80	500	30
1	300	20
KD 2482	300	30

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2483	300	10
4	1000	20
5	300	10
6	1000	100
7	1000	100
8	1000	100
9	300	30
90*	500	30
1	1000	30
2	1000	30
3	300	10
4	300	30
5	300	10
6	1000	10
7	1000	10
8	1000	500
9	1000	30
2500	500	30
1*	300	30
2	500	30
3	1000	30
4	300	30
5	300	30
6	300	30
7	500	30
8	500	5
9	1000	10
10	1000	20
1	500	5
2	300	5
3	300	5
4	200	10
5	100	10
6	100	3
7	100	20
8	100	20
9	100	10
20	100	30
1	200	5
2	100	10
3	100	20
4	100	20
5	100	10
6	100	30
7	200	30
8	200	50
9*	300	30
30	200	30
1	100	5
2	300	10
3	100	10
4	300	5
5	300	20
6	200	30
KD 2537	100	30

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2538	50	10
9	300	5
40	200	5
1*	300	5
2	300	30
3	200	5
4	200	5
5	300	10
6	1000	30
7	100	5
8	1000	10
9	500	10
50	1000	10
1	1000	20
2	300	20
3	300	10
4	300	10
5	300	30
6	300	30
7	300	10
8	500	3
9	1000	20
60	1000	20
1*	1000	30
2	500	30
3	300	30
4	500	10
5	500	30
6	200	30
7	200	10
8	200	20
9	300	3
70	300	10
1*	200	10
2	300	10
3	500	20
4	500	20
5	500	10
6	500	30
7	300	30
8	300	30
9	300	30
80	300	50
1*	300	20
2	500	10
3	300	10
4	200	10
5	300	10
6	300	30
7	300	30
8	300	30
9	300	30
90	300	30
1*	300	30
KD 2592	300	30

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2593	300	10
4	500	10
5	300	10
6	300	30
7	500	10
8	300	10
9	300	3
2600	500	20
1*	300	20
2	300	20
3	200	10
4	300	20
5	300	10
6	300	10
7	300	10
8	300	3
9	300	10
10	300	5
1*	300	20
2	300	20
3	1000	10
4	1000	10
5	300	10
6	300	3
7	300	(1
8	200	5
9	50	(1
20	200	(1
1*	200	(1
2	200	(1
3	300	(1
4	300	(1
5	100	(1
6	500	3
7	300	(1
8	50	(1
9	300	(1
30	200	(1
1*	200	(1
2	300	(1
3	1000	(1
4	300	(1
5	200	(1
6	50	(1
7	300	100
8	100	10
9	1000	30
40	1000	10
1*	1000	5
2	1000	10
3	300	5
4	100	20
5	200	10
6	500	(1
KD 2647	300	3

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2648	1000	10
9	1000	5
50	200	10
1	300	10
2	300	50
3	300	30
4*	300	5
5	300	20
6	300	10
7	1000	5
8	300	10
9	500	30
60	300	20
1	300	10
2	300	30
3	300	10
4	300	10
5*	300	30
6	300	10
7	300	10
8	300	20
9	300	50
70	200	30
1	300	30
2	500	5
3	200	30
4	1000	5
5	1000	30
6*	1000	30
7	500	30
8	1000	20
9	1000	10
80	1000	10
1	1000	10
2	1000	20
3	300	20
4	300	20
5	300	5
6	300	20
7	200	20
8	200	30
9	300	10
90	300	3
1	300	20
2	300	10
3	500	10
4	500	5
5	300	20
6	300	10
7	300	20
8*	300	10
9	300	30
700	300	30
1	200	30
KD 2702	100	10

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2703	300	30
4	100	10
5	500	20
6	300	20
7	200	20
8	100	20
9*	100	20
10	300	20
1	300	20
2	300	30
3	200	10
4	100	20
5	500	10
6	100	10
7	300	5
8	200	10
9	500	10
20	300	5
1	500	3
2	300	5
3	300	(1
4	200	(1
5	100	3
6	500	3
7	200	3
8	100	3
9	100	3
30	100	(1
1*	100	3
2	300	3
3	200	3
4	300	(1
5	200	(1
6	300	5
7	300	(1
8	300	(1
9	300	(1
40	300	(1
1	300	(1
2*	100	(1
3	1000	(1
4	300	(1
5	1000	(1
6	1000	(1
7	300	(1
8	1000	(1
9	300	(1
50	300	(1
1	500	10
2	1000	5
3*	1000	3
4	300	5
5	300	10
6	200	3
KD 2757	1000	5

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2758	1000	3
9	1000	3
60	1000	10
1	1000	5
2	300	3
3	1000	3
4*	1000	3
5	500	5
6	1000	10
7	300	3
8	500	3
9	100	(1
70	500	50
1	500	30
2	500	10
3	300	30
4	1000	20
5*	1000	20
6	1000	20
7	1000	30
8	1000	30
9	1000	30
80	1000	30
1	500	20
2	500	100
3	500	30
4	100	5
5	300	20
6*	300	100
7	300	50
8	300	30
9	1000	50
90	1000	50
1	1000	30
2	1000	5
3	1000	10
4	300	50
5	500	30
6	500	10
7*	1000	20
8	1000	50
9	1000	30
800	300	30
1	100	(1
2	200	(1
3	300	(1
4	300	5
5	300	5
6	1000	3
7	300	(1
8	300	(1
9	1000	10
10	1000	20
1*	300	10
KD 2812	100	5

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2813	200	20
4	300	10
5	1000	10
6	300	20
7	1000	5
8	1000	20
9	300	30
20	300	5
1*	300	20
2	300	30
3	300	20
4	300	5
5	300	30
6	300	20
7	500	5
8	300	10
9	300	5
30	300	20
1*	300	20
2	300	5
3	300	20
4	300	5
5	300	5
6	200	30
7	300	5
8	300	5
9	300	30
40	300	30
1*	300	5
2	300	10
3	300	10
4	(30	50
5	100	50
6	300	30
7	300	30
8	300	10
9	300	30
50	200	30
1	300	5
2	300	30
3	300	10
4	1000	10
5	300	10
6	1000	20
7	300	(1
8	1000	3
9	500	(1
60	300	10
1*	200	20
2	300	5
3	500	3
4	1000	3
5	300	3
6	300	(1
2867	300	5

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2868	300	(1
9	300	5
70	300	3
1*	500	(1
2	1000	100
3	300	5
4	500	3
5	300	5
6	200	5
7	300	(1
8	300	(1
9	300	30
80	200	20
1*	300	30
2	300	30
3	300	30
4	300	30
5	500	50
6	500	30
7	300	30
8	1000	30
9	1000	50
90	1000	20
1*	500	10
2	500	100
3	300	5
4	300	20
5	500	10
6	1000	3
7	300	10
8	300	5
9	200	10
900	300	5
1*	300	30
2	300	10
3	300	10
4	300	3
5	300	10
6	300	5
7	300	10
8	300	50
9	300	5
10	300	5
1*	300	100
2	300	30
3	100	10
4	100	5
5	100	30
KD 2916	500	30
KD 2951	500	30
2	500	20
KD 2953	500	30

SAMPLE NUMBER	Ba ppm	Sn ppm
KD 2954	500	20
5	500	30
6	500	30
7	300	10
8*	1000	30
9	300	30
60	300	3
1	300	10
2	300	5
3	200	20
4	200	20
5	300	5
KD 2966	200	5
KD 3001	100	30
2	300	10
3	200	10
4	300	10
5	300	3
6	300	10
7	500	20
8	500	10
9	1000	10
10	500	20
1*	500	20
2	300	10
3	500	3
4	500	20
5	500	20
6	300	10
7	300	10
8	300	10
9	300	20
20	200	20
1*	300	20
2	300	5
3	200	50
4	300	30
5	300	20
6	300	30
7	200	10
KD 3028	200	20

PREPARATION: Dried and sieved to - 80 mesh.

ANALYTICAL METHODS: Ba, Sn by Emission Spectrography Schemes ES2 and ES3.

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		KD 2002	KD 2042	KD 2059	KD 2075	KD 2089	KD 2090	KD 2099	KD 2151
ES 1	Be	1	3	3	3	3	3	3	3
	Co	(5	(5	(5	(5	5	(5	5	(5
	Cr	30	30	50	50	50	50	100	30
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	30	30	30	30	500	300	5000	100
	Mo	(3	(3	(3	(3	(3	(3	(3	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	3	5	5	30	50	30	30	20
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	30	50	50	100	30	50	50	50
	W	(50	(50	50	(50	50	50	(50	50
	Te	(100	(100	(100	(100	(100	(100	(100	(100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	0.1	1.0	1.0	0.2	1.0	0.5	1.0	1.0
	As	(50	(50	(50	(50	(50	(50	(50	(50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	30	100	100	30	50	30	100	100
	Cd	(3	3	(3	(3	3	(3	3	(3
	Cu	5	3	3	3	3	3	10	3
	Ge	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	20	30	30	20	30	30	100	50
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	5	10	10	5	10	5	100	20
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	(20	100	50	50	100	50	200	50
ES 3	Ba	2000	500	1000	300	500	300	500	1000
	Ca	1000	2000	3000	3000	3000	2000	2000	1000
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	(30	30	50	50	(30	50	50	50
	Ti	3000	3000	3000	5000	5000	5000	2000	5000
	Y	(10	(10	(10	(10	(10	(10	(10	(10
	Zr	(100	(100	(100	100	100	200	200	100
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	300	2000	1000	300	100	300	2000	1000
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	100	50	50	30	30	30	50	30

(Denotes less than

) Denotes greater than

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		KD2157	KD 2167	KD 2169	KD 2184	KD 2209	KD 2217	KD 2218	KD 2219
ES 1	Be	3	1	3	3	1	3	1	1
	Co	(5	5	(5	(5	5	10	10	(5
	Cr	(20	100	30	50	50	50	30	30
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	(5	2000	30	(5	300	1000	500	300
	Mo	(3	(3	(3	(3	(3	(3	(3	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	30	20	20	10	50	30	30	50
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	50	100	30	50	50	30	50	30
	W	(50	50	50	50	50	50	50	50
	Te	(100	(100	(100	(100	(100	(100	(100	(100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	1.0	0.3	1.0	0.5	0.5	1.0	1.0	0.5
	As	(50	(50	(50	(50	(50	(50	(50	(50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	50	50	30	50	30	50	50	30
	Cd	(3	3	(3	3	(3	(3	3	(3
	Cu	3	10	3	3	5	50	3	5
	Ge	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	10	30	10	30	100	50	50	30
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	10	5	5	5	300	50	30	10
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	50	100	50	100	30	50	100	50
ES 3	Ba	100	500	500	300	1000	1000	300	500
	Ca	2000	2000	1000	2000	5000	3000	2000	1000
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	50	50	50	50	50	50	(30	(30
	Ti	500	3000	3000	3000	3000	3000	3000	3000
	Y	(10	(10	(10	(10	(10	(10	(10	(10
	Zr	(100	100	(100	100	100	200	100	200
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	1000	500	500	1000	1000	1000	2000	1000
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	50	10	30	30	30	30	50	30

(Denotes less than

) Denotes greater than

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		KD 2222	KD 2223	KD 2224	KD 2225	KD 2227	KD 2234	KD 2807	KD 2808
ES 1	Be	3	3	3	3	3	1	5	5
	Co	(5	5	5	5	5	(5	(5	(5
	Cr	30	50	30	100	30	30	100	100
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	300	1000	500	300	300	200	20	(5
	Mo	(3	(3	(3	(3	(3	(3	(3	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	20	30	50	50	20	20	50	50
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	30	50	50	30	50	30	50	30
	W	50	50	(50	(50	(50	(50	(50	(50
	Te	(100	(100	(100	(100	(100	(100	(100	(100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	1.0	0.5	1.0	1.0	0.5	0.5	(0.1	(0.1
	As	(50	(50	(50	(50	(50	(50	(50	(50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	30	30	30	100	30	50	30	30
	Cd	(3	(3	(3	(3	(3	(3	(3	(3
	Cu	3	10	3	3	3	3	3	3
	Ge	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	30	50	30	100	50	50	30	30
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	10	10	10	30	10	5	(1	(1
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	50	30	50	50	50	50	200	100
ES 3	Ba	1000	2000	2000	2000	1000	500	300	300
	Ce	1000	1000	5000	5000	1000	1000	5000	2000
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	50	50	50	50	50	50	30	30
	Tl	5000	3000	5000	3000	3000	3000	1000	200
	Y	(10	(10	(10	(10	(10	(10	(10	(10
	Zr	100	200	100	200	200	(100	(100	(100
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	1000	500	1000	1000	300	300	(100	500
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	30	30	30	30	10	10	10	30

(Denotes less than

) Denotes greater than

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		KD 2811	KD 2814	KD 2782	KD 2789	KD 2879	KD 2880	KD 3008	KD 3009
ES 1	Be	3	3	3	3	5	5	5	3
	Co	(5	(5	(5	(5	(5	(5	(5	10
	Cr	(20	30	50	50	50	50	300	50
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	30	200	200	100	500	1000	500	3000
	Mo	(3	(3	(3	(3	(3	(3	10	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	5	30	30	50	30	30	50	30
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	30	50	50	50	50	50	50	30
	W	(50	(50	(50	(50	(50	(50	(50	(50
	Te	(100	(100	(100	100	100	100	100	100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	0.2	0.3	(0.1	0.3	0.5	0.5	0.3	(0.1
	As	(50	(50	(50	(50	(50	(50	(50	(50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	30	50	30	50	30	30	50	30
	Cd	(3	(3	(3	3	5	5	3	3
	Cu	3	3	1	3	3	1	10	10
	Ge	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	100	50	50	100	30	30	100	200
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	10	10	3	10	20	20	5	3
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	30	100	50	50	100	100	100	50
ES 3	Ba	300	300	500	1000	300	200	500	1000
	Ca	5000	3000	2000	2000	500	3000	500	1000
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	30	50	30	50	50	50	30	50
	Ti	500	1000	3000	2000	3000	5000	3000	5000
	Y	(10	(10	(10	(10	(10	(10	(10	(10
	Zr	(100	100	200	200	200	500	200	300
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	1000	1000	300	500	1000	500	300	(100
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	30	20	10	50	30	30	10	10

(Denotes less than

) Denotes greater than

APPENDIX NO. 4

ANALYTICAL RESULTS

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KS 2001	10	50	65	(2	370	0.95
2	20	70	30	(2	180	0.85
3	20	30	330	(2	1660	2.85
4	(2	20	20	(2	30	0.16
5	(2	20	20	(2	30	0.14
6	(2	20	20	(2	20	0.23
7	2	20	30	(2	20	0.22
8	2	20	30	(2	120	0.39
9	2	20	45	(2	20	0.20
10	2	30	20	(2	20	0.20
1	5	30	25	(2	30	0.22
2*	2	30	35	(2	30	0.22
3	10	40	40	(2	50	0.26
4	5	30	45	(2	100	0.31
5	5	100	30	(2	20	0.27
6	20	710	280	(2	190	5.50
7	35	1270	260	(2	140	5.80
8**	20	770	270	(2	180	3.85
8	25	790	260	2	190	4.00
9	20	580	280	(2	170	3.30
20	20	660	250	(2	160	2.85
1*	20	640	260	(2	150	2.85
2	25	440	260	(2	190	3.10
3	30	420	240	(2	190	3.15
4	20	290	250	(2	180	2.35
5	25	300	230	(2	180	2.30
6	25	310	240	(2	180	2.40
7	25	340	230	(2	180	2.40
8	30	360	260	(2	190	2.45
9	25	370	230	(2	190	2.35
30	30	420	270	(2	210	2.50
1	20	420	250	(2	230	2.65
2	30	430	300	(2	380	2.55
3	25	380	330	(2	520	3.90
4	10	50	180	(2	210	2.05
5*	10	50	210	(2	260	2.55
6	15	50	60	(2	160	0.28
7	40	80	110	(2	510	0.90
8	40	560	190	(2	1230	4.20
9	2	20	15	(2	20	0.95
40	50	90	95	(2	300	3.75
1*	45	80	110	(2	290	3.35
2	10	60	30	(2	20	2.85
3	25	90	150	(2	300	3.00
4	25	70	80	(2	40	2.00
5	20	120	170	(2	160	4.50
6	5	20	20	(2	20	0.23
KS 2047	10	20	15	(2	5	0.12

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KS 2048	5	40	20	(2	10	0.20
9	10	40	30	(2	40	0.70
50	30	40	20	2	50	1.25
1	30	40	25	2	40	1.25
2	40	30	85	2	510	3.30
3	15	60	50	2	1000	2.55
4	5	30	85	2	580	2.10
5	55	160	520	2	1680	4.40
6	20	60	260	(2	1290	3.55
7	10	40	200	(2	520	2.20
8	5	40	160	2	640	3.25
9	65	90	90	(2	90	1.60
60	20	40	110	(2	110	1.40
1*	25	40	90	(2	110	1.15
2	20	30	65	(2	90	1.25
3	15	30	20	(2	10	0.19
4	15	20	30	(2	20	0.44
5	40	30	35	(2	60	0.95
6	30	30	110	(2	590	1.70
7	20	20	95	(2	1110	2.40
8	15	40	190	(2	1080	3.35
9	15	40	65	(2	410	1.10
70	10	20	90	(2	80	1.70
1*	10	20	80	(2	60	1.60
2	20	50	110	(2	620	3.15
3	10	70	45	(2	50	0.37
4	10	20	20	(2	10	0.18
5	30	40	100	(2	240	2.00
6	25	40	160	(2	690	2.30
7	70	120	150	(2	490	2.15
8	2	120	10	(2	60	0.65
9	(2	20	20	(2	10	0.12
80	2	20	15	(2	10	0.10
1*	5	(20	10	(2	10	0.09
2	2	(20	15	(2	5	0.06
3	2	(20	15	(2	(5	0.07
4	2	20	10	(2	50	0.42
5	2	20	15	(2	5	0.06
6	10	380	85	(2	180	0.34
7	10	390	130	(2	440	1.05
8	10	110	45	(2	160	3.10
9	5	30	30	(2	70	0.28
90	10	80	60	(2	120	0.85
1*	10	90	60	(2	110	0.80
2	5	40	25	(2	40	1.00
3	15	50	90	(2	300	2.70
4**	10	30	20	(2	20	0.12
4	10	30	20	(2	20	0.11
5	(2	20	30	(2	5	0.13
6	(2	20	30	(2	20	0.13
7	(2	20	10	(2	30	0.24
8	(2	30	25	(2	5	0.11
9	(2	20	45	2	10	0.15
100	2	30	20	(2	10	0.13
KS 2101	(2	20	25	(2	10	0.14

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KS 2102	(2	20	35	(2	5	0.32
3	(2	40	10	(2	5	1.80
4	2	20	10	2	10	0.09
5	(2	20	25	(2	5	0.07
6	(2	20	40	(2	5	0.05
7	(2	20	20	(2	(5	0.09
8	(2	20	15	(2	(5	0.08
9	(2	20	20	(2	(5	0.09
10	(2	20	25	2	10	0.12
1*	(2	20	30	(2	10	0.11
2	(2	30	60	(2	130	0.26
3	(2	20	20	(2	5	0.10
4	2	20	20	(2	10	0.16
5	2	20	40	(2	10	0.13
6	(2	40	30	(2	20	0.09
7	(2	30	10	(2	20	0.10
8	(2	20	30	(2	10	0.08
9	(2	20	20	(2	30	0.14
20	10	190	870	2	20	0.06
1*	5	260	760	(2	10	0.06
2	(2	30	30	(2	20	0.08
3	(2	20	20	(2	10	0.05
4	(2	50	20	(2	10	0.06
5	(2	(20	15	(2	10	0.04
6	(2	20	30	(2	10	0.08
7	(2	360	140	(2	60	0.36
8	35	80	160	(2	140	2.20
9	10	60	70	(2	40	1.10
30	(2	50	25	(2	10	0.16
1*	2	50	20	(2	10	0.14
2	(2	30	15	(2	5	0.07
3	2	30	20	(2	10	0.17
4	(2	20	20	(2	(5	0.06
5	(2	20	10	(2	(5	0.18
6	(2	20	20	(2	5	0.05
7	(2	(20	15	(2	5	0.09
8	(2	20	20	(2	5	0.08
9	(2	20	10	(2	10	0.10
40	10	430	80	(2	140	1.20
1*	5	300	60	(2	120	1.05
2	15	200	150	2	240	1.90
3	20	70	80	(2	60	1.20
4	15	140	65	(2	100	1.35
5	5	40	80	(2	130	1.40
6	5	40	110	(2	180	1.80
7	30	30	120	(2	160	1.65
8	10	50	140	(2	160	2.05
9	75	230	170	(2	180	2.05
50	5	20	65	(2	90	2.30
1	5	20	60	(2	80	2.25
2	2	20	65	(2	100	1.95
3	10	840	340	(2	130	1.65
4	15	20	80	(2	90	1.60
5	15	30	80	(2	140	1.25
KS 2156	10	1190	260	(2	290	1.50

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KS 2157	15	240	220	(2	320	1.65
8	2	(20	25	(2	10	0.05
9	2	20	10	(2	5	0.09
60	25	20	60	(2	10	0.75
1	20	20	55	(2	10	0.80
2	5	20	40	(2	70	0.65
3	2	20	60	(2	320	1.75
4	(2	30	15	(2	20	0.20
5	(2	40	15	(2	10	0.12
6	(2	30	20	(2	10	0.30
7	2	50	20	(2	20	0.16
8	2	20	55	(2	60	0.20
9	2	20	35	(2	40	0.19
70	30	160	60	(2	60	0.23
1	2	20	30	(2	30	0.21
2	20	50	30	(2	30	0.21
3	(2	40	45	(2	120	0.32
4	10	60	55	(2	60	0.48
5	2	40	35	(2	70	0.24
6	(2	50	20	(2	150	0.17
7	2	30	15	(2	10	0.16
8	(2	30	25	(2	20	0.28
9	2	50	20	(2	30	0.16
80	10	60	30	(2	20	0.22
1	10	40	20	(2	10	0.05
2	(2	30	25	(2	30	0.04
3	(2	30	30	(2	40	0.11
4**	5	30	50	(2	50	0.89
4	5	40	45	(2	40	0.87
5	2	60	30	(2	20	0.18
6	5	60	60	(2	80	0.51
7	10	50	50	(2	60	0.37
8	(2	30	20	(2	20	0.09
9	5	50	130	(2	300	0.95
90	(2	20	10	(2	5	0.10
1	(2	30	10	(2	5	0.04
2	2	60	15	(2	(5	0.05
3	5	40	10	(2	(5	0.04
4	5	50	15	(2	(5	0.06
5	(2	30	10	2	(5	0.07
6	10	20	20	(2	(5	0.06
7	5	30	10	2	(5	0.06
8	10	50	25	(2	(5	0.21
9	2	60	10	2	(5	0.13
200	(2	40	10	(2	(5	0.18
1	2	50	10	(2	5	0.05
2**	2	40	10	(2	(5	0.03
2	(2	40	15	(2	(5	0.03
3	5	70	20	(2	(5	0.15
4	10	40	20	(2	(5	0.17
5	2	20	30	(2	(5	0.29
6	10	50	15	(2	5	0.17
7	10	90	55	(2	100	0.52
8	5	40	15	(2	5	0.14
KS 2209	2	50	10	(2	(5	0.10

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KS 2210	20	60	130	(2	240	1.09
1	(2	40	20	(2	10	0.84
2	2	40	15	(2	10	0.05
3	10	120	40	(2	30	0.34
4	5	60	20	(2	10	0.18
5	(2	50	15	(2	5	0.12
6	2	70	20	(2	5	0.16
7	(2	60	15	(2	5	0.07
8	10	50	30	(2	10	0.59
9	2	60	15	(2	5	0.06
20	2	90	45	(2	10	0.17
1	10	70	35	(2	10	0.17
2	(2	80	20	(2	10	0.07
3	(2	80	20	(2	5	0.06
4	5	70	40	(2	10	0.08
5	2	70	25	(2	10	0.07
6	10	120	55	(2	430	1.85
7	(2	120	90	(2	1150	2.20
8	2	110	110	(2	10	0.42
9	(2	90	100	(2	60	1.31
30	2	60	25	(2	10	0.16
1*	2	70	20	(2	10	0.17
2	10	130	150	(2	95	1.95
3	20	330	180	(2	110	1.02
4	2	90	15	(2	10	0.11
5	2	70	20	(2	5	0.10
6	2	70	15	(2	10	0.21
7	25	200	210	(2	50	0.38
8	20	140	30	(2	510	1.95
9	20	70	80	(2	50	1.58
40	15	100	200	(2	630	3.30
1*	15	110	200	(2	590	3.15
2**	10	90	160	(2	330	2.90
2	10	100	170	(2	340	3.00
3	5	60	50	(2	70	1.06
4	10	80	25	(2	10	0.13
5	5	80	35	(2	40	0.72
6	5	80	35	(2	35	0.72
7	(2	60	15	(2	10	0.24
8	5	160	25	(2	25	0.20
9	5	90	25	(2	20	0.10
50	15	190	110	(2	800	2.30
1*	15	180	120	(2	800	2.25
2	25	80	120	(2	430	2.20
3	25	120	100	(2	170	2.15
4	2	80	40	(2	130	0.62
5	20	120	120	(2	270	2.60
6	30	200	80	2	490	2.05
7	20	140	110	(2	750	2.55
8	10	100	30	(2	220	0.80
9	5	80	160	(2	360	2.00
60	10	80	130	(2	420	1.95
1*	10	100	120	(2	440	2.20
KS 2262	25	180	130	(2	800	3.55

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KS 2263	15	130	150	(2	1650	3.45
4	10	100	140	(2	580	2.30
5	5	70	60	(2	50	0.13
6	20	100	210	2	270	1.80
7	15	100	50	(2	80	1.12
8	15	90	150	(2	390	2.45
9**	65	170	150	(2	340	8.00
9	65	160	140	(2	340	8.02
70	2	70	20	(2	5	0.12
1*	2	70	35	(2	5	0.09
2	30	120	120	(2	290	2.10
3	2	70	20	(2	10	0.09
4	10	110	40	(2	90	0.18
5	2	90	20	(2	5	0.05
6	50	120	95	(2	55	1.70
7	5	50	30	(2	10	0.46
8	15	70	30	(2	30	0.81
9	5	70	15	(2	10	0.20
80	10	70	30	(2	10	1.14
1*	5	80	35	(2	10	1.13
2	5	80	40	(2	210	0.88
3	(2	60	10	(2	10	0.08
4	35	180	110	(2	190	3.70
5	10	100	30	(2	15	0.23
6	15	310	250	(2	1050	3.90
7	5	80	45	(2	5	0.16
8	2	70	20	(2	5	0.05
9	(2	80	20	(2	5	0.91
90	2	100	30	(2	5	0.08
1*	(2	100	20	(2	5	0.08
2	2	70	15	(2	5	0.16
3	5	60	10	(2	5	0.06
4	15	130	420	(2	280	0.72
5	30	860	880	(2	460	2.00
6	10	80	25	(2	30	0.19
7	25	320	420	(2	90	0.21
8	10	90	30	(2	40	0.12
9	2	70	80	(2	120	0.18
300	(2	90	35	(2	20	0.90
1*	2	80	45	(2	20	0.10
2	10	100	35	(2	140	0.17
3	5	110	55	(2	80	0.20
4	2	40	120	(2	40	0.18
5	(2	50	30	(2	5	0.06
6	2	80	20	(2	15	0.12
7	5	90	20	(2	35	0.29
KS 2308	2	80	55	(2	200	1.18

PREPARATION: Dried and sieved to -80 mesh.

ANALYTICAL METHODS: Cu, Pb, Zn, Ag, Mn and Fe by A.A.S. following HCL leach and HCL/HNO_3 leach for 1 hour in latter stages of 0.25 g sample.

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

APPENDIX NO. 5

ANALYTICAL RESULTS

SAMPLE NUMBER	Ba ppm	Sn ppm
KS2001	1000	30
2	300	50
3	500	50
4	500	50
5	1000	30
6	1000	50
7	500	30
8	1000	30
9	500	30
10	300	30
1	300	30
2	500	30
3	300	30
4	500	30
5	500	20
6	300	300
7	300	50
8	300	30
9	100	30
20	100	30
1	100	30
2	100	20
3	200	20
4	300	20
5	300	30
6	300	30
7	300	30
8	300	30
9	500	30
30	500	30
1	400	30
2	100	50
3	500	50
4	500	30
5	300	30
6	300	30
7	100	20
8	100	50
9	300	30
40	300	30
1	1000	100
2	1000	50
3	1000	30
4	1000	30
5	1000	50
6	1000	30
7	1000	200
8	2000	30
KS2049	1000	30

SAMPLE NUMBER	Ba ppm	Sn ppm
KS 2050	1000	50
1	500	30
2	1000	100
3	500	30
4	500	30
5	500	100
6	500	50
7	500	20
8	500	30
9	500	20
60	300	30
1	500	30
2	500	50
3	500	30
4	300	20
5	300	30
6	300	30
7	300	100
8	300	50
9	500	30
70	300	300
1	300	30
2	100	50
3	500	30
4	300	30
5	500	50
6	300	50
7	500	30
8	500	30
9	500	10
80	300	20
1	1000	30
2	1000	20
3	300	20
4	500	50
5	300	10
6	1000	30
7	1000	10
8	500	50
9	1000	30
90	1000	30
1	1000	30
2	1000	10
3	1000	100
4	1000	30
5	1000	30
6	1000	10
7	300	10
KS 2098	1000	10

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KS 2099	1000	10
100	1000	30
1	2000	20
2	1000	10
3	1000	30
4	1000	10
5	1000	5
6	1000	3
7	2000	3
8	1000	10
9	2000	10
10	500	10
1	1000	10
2	1000	10
3	500	10
4	500	30
5	1000	30
6	500	20
7	300	50
8	500	20
9	500	5
20	300	10
1	300	30
2	500	20
3	300	30
4	1000	50
5	1000	50
6	1000	300
7	500	50
8	500	30
9	500	30
30	500	30
1	1000	30
2	300	30
3	100	30
4	500	20
5	300	20
6	300	30
7	300	30
8	300	500
9	500	30
40	500	30
1	500	30
2	1000	30
3	500	50
4	500	30
5	500	30
6	300	30
7	500	30
8	500	30
9	300	30
50	300	50
1	500	30
2	500	30
KS 2153	500	30

SAMPLE NUMBER	Ba ppm	Sn ppm
KS 2154	500	30
5	300	30
6	300	50
7	300	50
8	100	10
9	100	5
60	500	10
1	1000	30
2	1000	30
3	500	30
4	500	5
5	1000	5
6	500	10
7	500	10
8	500	10
9	300	3
70	300	5
1	300	3
2	1000	5
3	1000	3
4	1000	5
5	1000	10
6	1000	10
7	500	10
8	500	100
9	500	30
80	300	10
1	200	10
2	300	5
3	500	5
4	1000	3
5	1000	3
6	1000	3
7	1000	(1
8	1000	3
9	1000	3
90	1000	20
1	500	10
2	500	3
3	300	3
4	500	3
5	300	20
6	1000	20
7	300	3
8	300	3
9	300	(1
2200	300	10
1	500	(1
2	1000	10
3	1000	10
4	500	20
5	1000	30
6	1000	10
7	1000	30
KS 2208	1000	10

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Ba ppm	Sn ppm
KS 2209	1000	10
10	1000	100
1	1000	30
2	300	10
3	1000	20
4	1000	10
5	500	5
6	1000	5
7	300	5
8	300	10
9	300	10
20	500	20
1	300	20
2	200	(1
3	300	5
4	200	(1
5	300	(1
6	300	10
7	300	10
8	1000	5
9	300	30
30	50	10
1	1000	10
2	1000	30
3	1000	30
4	300	30
5	500	3
6	300	10
7	200	10
8	300	50
9	1000	10
40	200	10
1	200	10
2	300	10
3	200	5
4	200	10
5	300	20
6	300	10
7	500	20
8	300	30
9	1000	10
50	500	10
1	500	10
2	300	30
3	1000	5
4	300	5
5	300	10
6	200	(1
7	1000	5
8	1000	5
9	1000	10
60	1000	300
1	300	300
2	300	10
KS 2263	200	10

SAMPLE NUMBER	Ba ppm	Sn ppm
KS 2264	200	5
5	200	10
6	1000	10
7	1000	10
8	1000	10
9	300	10
70	100	5
1	300	10
2	300	20
3	300	5
4	300	20
5	300	10
6	300	10
7	300	30
8	300	20
9	300	20
80	300	30
1	1000	30
2	500	20
3	300	10
4	500	10
5	1000	10
6	500	30
7	300	10
8	1000	10
9	500	5
90	500	(1
1	300	(1
2	1000	(1
3	300	(1
4	1000	10
5	300	10
6	300	(1
7	1000	10
8	300	20
9	1000	5
2300	1000	5
1	300	5
2	500	5
3	300	10
4	1000	10
5	300	3
6	500	20
7	300	5
KS 2308	300	10

PREPARATION: Dried and sieved to - 80 mesh.

ANALYTICAL METHODS: Ba and Sn by Emission Spectrography Schemes ES2 and ES3.

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		2003	2016	2017	2018	2019	2020	2021	2022
ES 1	Be	10	3	3	5	5	3	5	3
	Co	(5	(5	(5	(5	(5	(5	(5	(5
	Cr	30	30	100	(30	30	30	50	30
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	2000	200	200	200	200	100	100	200
	Mo	(3	(3	(3	(3	(3	(3	(3	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	50	30	100	5	20	20	100	30
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	100	50	50	30	100	50	50	50
	W	(50	(50	(50	(50	(50	(50	(50	(50
	Te	100	100	100	(100	100	100	100	100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	As	50	50	50	50	50	50	50	50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	50	100	100	100	100	100	100	100
	Cd	3	5	5	5	3	3	3	5
	Cu	20	20	30	20	10	20	20	20
	Ga	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	30	500	1000	1000	500	500	500	500
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	50	300	50	30	30	30	30	20
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	300	300	300	300	300	200	300	200
ES 3	Ba	500	300	300	300	100	100	100	100
	Ca	500	2000	1000	500	1000	500	2000	1000
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	30	(30	50	30	30	(30	(30	(30
	Ti	1000	3000	3000	1000	5000	3000	3000	1000
	Y	(10	(10	(10	(10	(10	(10	(10	(10
	Zr	(100	100	300	100	300	300	100	200
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	500	1000	1000	1000	1000	1000	1000	3000
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	30	10	10	10	10	10	10	10

(Denotes less than

) Denotes greater than

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		2023	2030	2031	2032	2033	2038	2055	2121
ES 1	Be	3	3	5	3	4	3	3	3
	Co	(5	(5	(5	(5	(5	(5	10	(5
	Cr	50	(20	50	100	30	50	(20	20
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	300	200	200	300	500	1000	2000	30
	Mo	(3	(3	(3	(3	(3	(3	(3	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	10	10	5	10	30	20	10	5
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	50	100	30	50	50	100	50	50
	W	(50	(50	(50	(50	(50	(50	(50	(50
	Te	100	(100	100	100	100	100	(100	(100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	1.0	0.3	1.0	1.0	1.0	1.0	1.0	2
	As	50	(50	50	50	50	50	100	(50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	100	30	100	100	100	200	200	50
	Cd	3	(3	3	5	3	5	5	10
	Cu	30	30	20	30	30	30	50	10
	Ge	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	300	300	300	300	300	500	200	200
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	20	30	30	50	50	50	100	10
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	200	300	200	300	300	200	500	1000
ES 3	Ba	200	500	400	100	500	100	500	300
	Ca	500	500	3000	500	1000	300	500	100
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	30	(30	(30	(30	(30	50	(30	30
	Ti	1000	1000	1000	3000	5000	1000	1000	500
	Y	(10	(10	(10	(10	(10	(10	(10	(10
	Zr	(100	100	100	300	300	(100	100	100
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	1000	300	2000	1000	1000	2000	2000	300
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	10	(10	10	10	(10	10	30	10

(Denotes less than

) Denotes greater than

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		2121	2140	2153	2156	2170	2189	2207	2210
ES 1	Be	3	3	3	5	5	3	3	3
	Co	(5	(5	(5	10	(5	(5	(5	(5
	Cr	30	100	(20	(20	30	30	30	30
	Ir	(2	(2	(2	(2	(2	(2	(2	(2
	Mn	10	100	100	300	50	300	100	200
	Mo	(3	(3	(3	(3	(3	(3	(3	(3
	Nb	(20	(20	(20	(20	(20	(20	(20	(20
	Ni	10	10	30	50	50	20	30	10
	Os	(10	(10	(10	(10	(10	(10	(10	(10
	Pd	(10	(10	(10	(10	(10	(10	(10	(10
	Pt	(10	(10	(10	(10	(10	(10	(10	(10
	Re	(10	(10	(10	(10	(10	(10	(10	(10
	V	100	100	50	100	50	30	30	30
	W	(50	(50	(50	(50	(50	(50	(50	(50
	Te	100	100	(100	(100	100	100	100	(100
	Th	(100	(100	(100	(100	(100	(100	(100	(100
ES 2	Ag	0.5	1.0	1.0	1.0	0.5	0.3	0.3	0.5
	As	50	50	50	50	(50	(50	(50	(50
	Au	(3	(3	(3	(3	(3	(3	(3	(3
	Bi	50	50	50	50	50	40	50	50
	Cd	10	(3	3	3	(3	(3	(3	(3
	Cu	3	10	10	10	30	5	10	20
	Ge	(1	(1	(1	(1	(1	(1	(1	(1
	In	(5	(5	(5	(5	(5	(5	(5	(5
	Pb	200	300	1000	1000	200	50	100	50
	Sb	(30	(30	(30	(30	(30	(30	(30	(30
	Sn	30	30	30	50	5	3	30	100
	Tl	(1	(1	(1	(1	(1	(1	(1	(1
	Zn	1000	100	300	300	50	100	50	100
ES 3	Ba	300	500	500	300	300	1000	1000	1000
	Ca	3000	3000	2000	500	2000	300	500	500
	Ce	(300	(300	(300	(300	(300	(300	(300	(300
	La	(100	(100	(100	(100	(100	(100	(100	(100
	Sc	(50	(50	(50	(50	(50	(50	(50	(50
	Sr	(30	(30	30	(30	30	30	50	30
	Tl	2000	1000	500	500	2000	)10000	100	1000
	Y	(10	(10	(10	(10	(10	10	(10	(10
	Zr	300	300	(100	100	100	300	(100	(100
ES 4	Hg	(30	(30	(30	(30	(30	(30	(30	(30
	P	500	100	100	100	1000	500	1000	1000
	Te	(20	(20	(20	(20	(20	(20	(20	(20
ES 6	B	30	10	10	10	30	10	30	30

(Denotes less than

) Denotes greater than

APPENDIX NO. 7

ANALYTICAL RESULTS

SAMPLE NUMBER		Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KR	1009	2	(20	10	(2	110	1.25
	1034	5	(20	20	(2	110	1.50
	1057	2	(20	100	(2	290	2.4
	1089	(2	(20	35	(2	30	7.6
	1108	10	(20	160	(2	1210	4.4
	1109	25	(20	170	(2	1330	5.3
	1112	5	(20	140	(2	1260	5.0
	1128	5	(20	160	(2	940	4.8
	1146	15	(20	85	(2	870	4.2
	1154	20	(20	85	(2	760	3.5
	1158	(2	(20	10	(2	30	2.1
	1170**	5	(20	25	(2	110	1.52
	1170	5	(20	20	(2	120	1.54
	1236	10	(20	100	(2	1750	3.9
	1238	25	(20	50	(2	450	4.6
	1239	10	(20	170	(2	1440	3.1
	1246	2	(20	25	(2	50	1.18
	1266	2	(20	110	(2	730	3.4
	1267	5	(20	130	(2	220	4.4
	1272	5	(20	10	(2	100	1.15
	1294	40	(20	55	(2	50	3.1
	1295	2	(20	50	(2	120	3.4
	1301	5	(20	90	(2	2250	2.9
	1302	(2	(20	50	(2	90	1.60
	1303	10	(20	160	(2	400	2.6
	1304	10	(20	300	(2	680	2.6
	1305	20	(20	260	(2	530	3.1
	1306	5	(20	190	(2	660	3.2
	1310	5	(20	70	(2	60	0.55
	1314	5	(20	40	(2	100	1.22
	1319	2	(20	20	(2	40	1.70
	1321	5	(20	15	(2	100	1.49
	1347	5	(20	25	(2	60	4.6
	1354	2	(20	55	(2	170	1.85
	1357	10	(20	40	(2	250	1.68
	1358	2	(20	50	(2	250	2.4
	1372	2	(20	25	(2	310	1.72
	1373	(2	(20	95	(2	940	3.8
	1377**	110	(20	160	(2	970	3.4
	1377	110	(20	160	(2	960	3.4
	1378	20	(20	120	(2	1800	7.6
	1385	5	(20	55	(2	300	1.30
	1386	(2	(20	15	(2	40	1.75
	3034	(2	(20	15	(2	50	0.44
	3046	10	(20	20	(2	30	0.95
	3047	15	(20	10	(2	10	2.8
	3048	30	(20	75	(2	770	3.2
	3050	15	(20	55	(2	370	2.8
KR	3053	5	(20	15	(2	40	0.56

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

SAMPLE NUMBER	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	Fe %
KR 3055	2	(20	2	(2	50	1.08
3057	2	(20	15	(2	320	1.78
3071	5	80	40	(2	280	1.13
3079	10	20	180	(2	990	5.7
3096	15	20	20	(2	150	6.3
3099	50	(20	110	(2	190	2.2
3101	(2	(20	10	(2	50	5.4
3102	5	(20	10	(2	80	9.7
3104	5	(20	20	(2	50	7.6
3107	5	(20	10	(2	30	18.4
3110	2	(20	15	(2	50	3.2
3116	220	(20	180	2	760	45.0
3118	320	(20	240	(2	930	37.0
3119	10	(20	60	(2	170	21.0
3120	120	50	70	(2	120	36.0
3121	170	20	140	(2	220	18.7
3124	10	(20	260	(2	240	2.4
3130	10	(20	20	(2	30	1.38
3134	10	(20	10	(2	60	1.98
3136	10	(20	10	(2	100	19.8
3137**	5	(20	15	(2	30	6.2
3137	2	(20	15	(2	30	6.1
3141	5	(20	95	(2	670	2.7
3154	25	(20	590	(2	120	1.45
3155	5	(20	75	(2	220	2.9
3157	10	(20	30	(2	50	2.5
3158	50	(20	160	(2	180	3.1
3166	10	(20	15	(2	90	1.17
3167	5	(20	10	(2	140	2.2
3168	10	(20	10	(2	180	2.5
3169	2	(20	10	(2	70	2.4
3262	20	(20	90	(2	9800	9.1
3277	2	(20	15	(2	20	0.48
3354	5	(20	10	(2	30	6.0
3371	30	(20	260	(2	240	3.4
KR 3373	40	(20	20	(2	80	2.1

PREPARATION: Crushed and pulverised.

ANALYTICAL METHODS: Cu, Pb, Zn, Ag, Mn, Fe, Cd by A.A.S. following hot conc. HCL leach and HCL/HNO_3 leach in latter stages for 1 hour of 0.25 g sample.

NOTE: Cd results not tabulated. All samples, including duplicates and check analyses returned a value of (2.

• Denotes duplicate of previous sample.

•• Denotes repeat and check.

(Denotes less than.

APPENDIX NO. 8

ANALYTICAL RESULTS

SAMPLE NUMBER		As ppm	Sn ppm
KR	1009	(5	30
	1034	10	50
	1057	10	20
	1089	10	100
	1108	(5	30
	1109	(5	30
	1112	(5	5
	1128	(5	5
	1146	20	200
	1154	(5	10
	1158	(5	10
	1170	(5	10
	1236	10	5
	1238	(5	30
	1239	(5	10
	1246	(5	10
	1266	(5	30
	1267	(5	20
	1272	(5	5
	1294	(5	20
	1295	(5	3
	1301	(5	1
	1302	(5	1
	1303	(5	(1
	1304	(5	3
	1305	(5	10
	1306	(5	30
	1310	(5	5
	1314	(5	3
	1319	(5	5
	1321	(5	3
	1347	(5	20
	1354	(5	10
	1357	(5	30
	1358	(5	50
	1372	20	5
	1373	(5	100
	1377	(5	5
	1378	(5	30
	1385	(5	3
	1386	(5	(1
	3034	(5	10
	3046	20	20
	3047	30	(1
	3048	(5	(1
	3050	(5	(1
	3053	(5	3
	3055	(5	5
KR	3057	(5	5

SAMPLE NUMBER		As ppm	Sn ppm
KR	3071	(5	1
	3079	(5	5
	3096	(5	5
	3099	(5	5
	3101	(5	(1
	3102	(5	(1
	3104	(5	(1
	3107	(5	(1
	3110	(5	5
	3116	(5	(1
	3118	—	—
	3119	(5	(1
	3120	(5	3
	3121	(5	(1
	3124	(5	3
	3130	(5	(1
	3134	(5	(1
	3136	(5	5
	3137	(5	(1
	3141	(5	1
	3154	40	5
	3155	30	10
	3157	30	(1
	3158	20	10
	3166	(5	(1
	3167	(5	(1
	3168	(5	(1
	3169	(5	3
	3262	30	(1
	3277	(5	(1
	3354	(5	5
	3371	(5	(1
KR	3373	(5	20

SAMPLE NUMBER		Ba ppm	Au ppb
KR	3104	200	
	3107	50	
	3134	100	
	3136	100	
	3154	500	(20
KR	3157	500	(20

ANALYTICAL METHODS

As - Modified Gutzeit method
Sn, Ba - Emission Spectrography
Schemes ES2 and ES 3.
Au - Special Low Level CRA/AAS.

* Denotes duplicate of previous sample.

** Denotes repeat and check.

(Denotes less than.

GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All values in ppm

GROUP		SAMPLE NUMBER							
		KR 3071	KR 3120	KR 1304	KR 3154	—	—	—	—
ES 1	Be	1	1	5	3				
	Co	(5	(5	(5	(5				
	Cr	(20	(20	30	(20				
	Ir	(2	(2	(2	(2				
	Mn	300	100	500	100				
	Mo	(3	(3	(3	(3				
	Nb	(20	(20	(20	(20				
	Ni	(3	3	5	3				
	Os	(10	(10	(10	(10				
	Pd	(10	(10	(10	(10				
	Pt	(10	(10	(10	(10				
	Re	(10	(10	(10	(10				
	V	20	20	100	30				
	W	(50	(50	(50	(50				
	Ta	(100	(100	(100	(100				
	Th	(100	(100	(100	(100				
ES 2	Ag	(0.1	1	0.2	0.2				
	As	(50	(50	(50	(50				
	Au	(3	(3	(3	(3				
	Bi	30	50	30	30				
	Cd	(3	(3	(3	(3				
	Cu	5	100	10	30				
	Ge	(1	(1	(1	(1				
	In	(5	(5	(5	(5				
	Pb	100	50	10	10				
	Sb	(30	(30	(30	(30				
	Sn	1	3	3	5				
	Tl	(1	(1	(1	(1				
	Zn	50	100	300	500				
ES 3	Bo	500	100	1000	100				
	Ca	300	1000	500	300				
	Ce	(300	(300	(300	(300				
	La	(100	(100	(100	(100				
	Sc	(50	(50	(50	(50				
	Sr	(30	(30	(30	(30				
	Ti	1000	1000	1000	1000				
	Y	(10	20	(10	(10				
	Zr	100	500	100	100				
ES 4	Hg	(30	(30	(30	(30				
	P	1000	2000	500	1000				
	Te	(20	(20	(20	(20				
ES 6	B	10	(10	10	30				

(Denotes less than

) Denotes greater than

Ian R. Pontifex & Associates Pty. Ltd.

TEL. 332 6744
A.H. 31 3816

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

APPENDIX NO. 10

MINERALOGICAL REPORT NO. 2228

7th October, 1977.

TO: Mr. M.C. Rogers,
Geo Peko Ltd.,
P.O. Box 598,
DEVONPORT. Tasmania 7310

Attention: Mr. G.D. Strickland

YOUR REFERENCE: Order KP 1241

MATERIAL: Rock Samples KR 1209 to KR3241 various intermediate numbers.

WORK REQUESTED: Petrographic examinations and comments as requested

SAMPLES & SECTIONS: Returned to you

PONTIFEX & ASSOCIATES PTY. LTD.

COMMENTS

A. GENERAL

Each rock is given a fairly objective description, a name with comments on genesis and comparisons with other samples where appropriate. As in previous work all off cuts are stained with sodium cobaltinitrite to highlight the abundance and distribution of potash felspar.

Numerous colored photomicrographs are appended to show characteristic textures (and compositions) at various scales. It is hoped that examination of these photos, in conjunction with the individual descriptions, especially the examination of photos of representative samples diagnostic of the different rock groups defined below, will assist in the integration of petrographic data with the assessments of the rocks in the field.

B. ROCK GROUPS (and nomenclature)

Various rock groups have been isolated in previous investigations, and definitions of the nomenclature employed has also been provided in previous reports. Notably in report 2017 (12/8/76) outlined the classification criteria and rock naming of pyroclastic facies. Report 2184 (3/8/77) defined the range of facies expected in the evolution of a volcanic sequence of the types being investigated, including tuffs, lavas, and the gradational facies between these two fairly distinct families, i.e. tuff-lavas (or pyroclastic flow rocks).

.../

Report 2104 (28/2/77) isolated the following rock groups,

(a) biotite felspar quartz porphyry, uncleaved,
(b) biotite felspar quartz porphyry, sheared,
(c) lithic quartz crystal tuffs.

The suite of 40 rocks described in this report are subdivided more or less according to the criteria discussed in these previous reports, and are set out below. (Following this, further, brief comments are made on the relationships of the rock groupings to the groupings made in those previous reports).

1. "Porphyries"

Characteristically this group contains phenocrysts of minor biotite, essential felspar (plagioclase and/or orthoclase) and quartz. Rare hornblende occurs in some. These phenocrysts occur in a homogeneous distinctly microcrystalline mosaic of quartz and potash felspar, minor disseminated fine chlorite-biotite. The biotite is generally chloritised, the felspars variably replaced by sericite ± clays, very rare epidote and carbonate. This appears to be essentially deuteric. There is generally no clear evidence of primary flow, however the groundmass may be sheared (with shredded streaky metamorphic sericite). Some representatives are brecciated.

Accessory crystals of cerium-epidote (allanite or orthite) are commonly present, magnetite occurs in some.

.../

These "porphyries" have an essential rhyolitic composition; they may be extrusives or very high-level intrusives.

The representatives are:

1270
3180
1284
1266
1129
1263
1031
1117
1153
1386 complete pervasive sericitic alteration
3045 brecciated and chloritised

2. Rhyolitic Lavas

This group is also porphyritic, and with a gross rhyolitic composition; some are difficult to macroscopically distinguish from the porphyries above (and from tuff-lavas below). However they are isolated on the basis of a distinctly glassy groundmass, (albeit altered to devitrified and/or micro mottled, spherulitic quartz mixed with 'sericite'), and by relict flow textures in the groundmass (which may be dominated by and confused with shearing).

They contain 'genuine' subhedral to euhedral phenocrysts, as distinct from tuffaceous fragments and splinters of crystals. They generally lack the biotite seen in the "porphyries", and allanite is absent.

.../

The representatives are:

1276
3141
3155 dominated by devitrified glassy groundmass
1302 " " " " "
3280
3275
1040
1322 as for 3155
3209 flow textured and sheared

3. Tuff-lavas

As noted in previous reports this facies includes pyroclastic flow rocks which displays the petrographic characteristics of both tuff and lava; however in this suite relict flow textures are commonly dominated by and thus may be confused with superimposed shear textures.

Basically these rocks have a gross rhyolitic composition. They have an altered glassy matrix, with relict flow characteristics, but with few exceptions this is not a eutaxitic welded-shard type matrix which may be distinctive of ignimbrite or vitric-tuff, but is rather more closely related to the glassy groundmass in the rhyolitic lavas above. Subhedral to euhedral quartz and felspar phenocrysts are generally present, but splintery fragments of these crystals and minor lithic fragments are also present, indicating a tuff component.

For the purposes of mapping they may be considered to be more closely aligned to, and almost certainly gradational into genuine lavas, rather than to the tuff facies described below (and may be given a field name of tuffaceous lavas).

The representatives are:

1228
1330
3155
1188

.../

4. Tuffs

This group is named according to the definitions given in previous report 2017. They also have a predominantly, gross rhyolitic composition but most are distinguished by vague layering of crystals and crystal fragments, and/or volcanic rock fragments, generally within a patchy matrix of altered glass. The matrix is commonly very sheared with schistose, shredded streaks of sericite.

Some of these tuffs consist of a welded mass of rock fragments of the same composition (rhyolite or "porphyry"), in which case it is virtually impossible to macroscopically distinguish the fragmental character and thus may be identified as lava or porphyry in hand specimen.

The representatives are:

3273	3221
3033	1042
1209	1374
1234	1364
1226	3070
1289	
3119	
1061	

5. OTHERS

Sample 1108 is identified as a biotite-orthoclase-quartz intrusive in which the biotite is completely chloritised.

Sample 3360 is a (plagioclase or cordierite) muscovite garnet sericite quartz schist, i.e. a metasediment. Samjle 3241 is a sericitic quartzite (recrystallised) and may be considered as a derived volcaniclastic sediment.

.../

C. COMPARISON WITH PREVIOUS REPORTS

The "porphyry" facies in this suite appears to texturally correspond to the porphyries isolated in report 2104. However in gross sense they are predominantly rhyolitic compared with the generally rhyodacitic to dacitic character of the samples in report 2104.

The lavas, tuffs and tuff-lavas, and the problems of distinguishing between them largely due to shearing, are essentially the same as these groups in report 2184. A brief re-examination of the large 'lava' group in report 2184 indicates that it may also be subdivided into biotite felspar quartz "porphyries" and porphyritic lavas, on the same criteria as described above, (although there is no accessory allanite).

The new subdivision of that report 2184 group of samples are as follows:

"Porphyries" (rhyolitic gradational to rhyodacitic)

2511 ? 2764
2527
(2) 2502
(93) 2583
(30) 2522
(63) 2507

"Porphyritic lavas"

2560
2659
2672
2684
2585
2541
2740
2765
(113)2621
(114)2622

.../

D. COMMENTS ON SPECIFIC POINTS RAISED IN YOUR COVERING LETTER

1. Sample Nos. 1284, 1263, 1031, 1040 and 1117 all belonging to the one rock group of biotite felspar quartz porphyry, except 1040 which is classified as a porphyritic rhyolite. This sample 1040 has a highly potassic flow textured groundmass containing patches of devitrified glass, quite different to the homogeneous microcrystalline groundmass in the porphyries.

2. Sample 3141 and 3155 are both broadly classified as rhyolitic lava, however 3155 contains a higher proportion of finer, devitrified glassy groundmass and less phenocrysts than 3141. (Sample 3155 is very similar to 1302).

3. The samples listed under your point (3) have a wide distribution through several rock groups. Sample 1284 is a porphyry. Samples 3141, 1302, are rhyolitic lavas. Samples 1228 and 1188 are tuff lavas - gradational to lava. Samples 3280 and 3275 are rhyolitic lavas. Basically however the only really distinctly different rock in this group is the 1284 porphyry. (There are no tuffs in the group).

4. Sample 3033 is a sheared (rhyolitic) tuff with chlorite alteration 1031 is an extensively sheared porphyry, also with chlorite alteration, 3280 is a rhyolitic lava relatively non-sheared, with a cryptocrystalline potasic groundmass containing scattered bleb-like quartz. There is no real comparison between primary characteristics of these three rocks.

KR 1025: sheared biotite felspar quartz porphyry, with (metamorphic) sericitic schistose matrix

Field note: ash flow crystal tuff

Subrounded and embayed quartz crystals (40%) ranging from 0.1 to 4mm, minor, smaller recrystallised argillised and attenuated felspar crystals (10%), also clouded biotite (7-10%), are all randomly disposed through a schistose ultrafine matrix.

This matrix consists of braided,shredded streaks of sericite, locally intimately intergrown with fine biotite within diffuse microcrystalline to cryptocrystalline quartz.

To a large extent the texture and composition of this rock is dominated by the new metamorphic characteristics resulting from shearing. In view of the relict coarse biotite, which is diagnostic of the porphyries described above, rather than the tuffs, the rock is interpreted as a sheared equivalent of that facies.

1031: biotite felspar quartz porphyry of rhyolitic composition; completely chloritised biotite, abundant shears through groundmass occupied by extremely fine sericite, + chlorite biotite Ti-Fe oxides

Field note: coarse andesitic ?, porphyry with abundant ferromags

This is indeed a 'porphyry' essentially the same as the group 1266, 1129, 3180, 1263 described above. Phenocrysts consist of large rounded and embayed quartz (35%), crystals of stressed and argillised felspar (10%), and quite coarse chloritised biotite (10-12%). These occur in a microcrystalline groundmass of essential quartz, potash felspar, minor plagioclase and dispersed chlorite (after fine biotite).

Parallel, streaky braided networks of fine sericite ± accessory equally fine chlorite, biotite and trains of titaniferous and ironoxides occur sporadically through the groundmass. These fill shear domains but the micas do not appear to be completely metamorphic (as in 1025 for example) but rather they seem to largely represent hydrothermal alteration along shears.

KR 1040: porphyritic, glassy alkaline, rhyolite lava, accessory biotitised hornblende phenocrysts, moderate sericitic alteration of (potash) felspar

Field note: coarse ? andesitic, quartz felspar, ferromag porphyry

Subhedral to euhedral, and deeply embayed quartz phenocrysts (15-20%), and fiarly extensively sericitised phenocrysts of potash felspar and minor plagioclase are evenly disposed through a rather heterogeneous altered glassy matrix Several small euhedral hornblende phenocrysts, completely pseudomorphically replaced by biotite are also present.

The groundmass displays a variety of flow textures. It consists of patch diffuse micromosaic of clouded potash felspar, with scattered patchy, micro mottled quartz, all devitrified alteration products after potassic-felsic and siliceous glass. Several clusters of oxidised fine biotite and/or micaceous hematite are scattered.

KR 1042: sheared, quartz, felspar (rhyolitic); lithic (vitric) crystal tuff

Field note: pale crystal tuff, quartz felspar

This rock consists largely of a roughly layered, loosely packed aggregate of subrounded to subhedral and embayed, and some angular, volcanic quartz crystals (30-35%) average size about 1.5mm. Minor crystals of potash felspar (10%), ? plagioclase ? (10%) apparently fragments of altered glass and of quartz mosaic, all form part of this aggregate.

The matrix between these grains consists of ultra fine quartz mixed with clouded ultra fine potassic material, with intimately intergrown shredded, streaky, braided foliae of 'sericite'. The 'sericite' appears to be sheared, altered-volcanic glass materials.

1061: crystal lithic tuff or volcanic breccia, composed of a tightly packed more or less fused mass of glassy porphyritic rhyolite fragments

Field note: rhyolitic porphyry quartz, felspar

Macroscopically, abundant, quite coarse (1-3mm) volcanic quartz crystals and subordinate felspar crystals are seen scattered throughout an extremely fine matrix which staining indicates is highly potassic. In thin section, abundant, much smaller (0.1mm) angular splintery grains of quartz are also seen widely scattered. The matrix is seen to consist of cryptocrystalline potassic material, intimately mixed with minor ultra fine chlorite and diffuse microcrystalline quartz, (devitrified glass).

Specific rock fragments, several mm across are very vaguely defined within the rather confused mass of these components. Certainly the tightly packed, rather fused aggregate of these fragments, and the virtually identical composition of them, makes it extremely difficult to recognise the inherently fragmental texture. Coarse volcanic quartz crystals which are not enclosed in the fragments are also scattered. The rock may be interpreted as a silt welded rhyolitic breccia (? flow breccia), or as a pyroclastic (crystal lithic tuff).

KR 1108: patchy (orthoclase)biotite quartz aggregate, (? incipient pegmatitic segregation of intrusive origin, grading into porphyritic micro granite); pervasive chlorite alteration of biotite; scattered secondary titania minerals, accessory orthite (allanite)

Field note: dark green lithic vitric crystal tuff

This rock had a somewhat heterogeneous texture and composition, but the majority of it has microcrystalline, intrusive characteristics rather than volcanic. It consists mainly of small patches of stressed, allotriomorphic quartz mosaic with minor intergranular potash felspar, with areas between these patches composed of fine chlorite replacing biotite.

The form of the individual quartz crystals, and the aggregate they form is essentially plutonic, with no suggestion of subhedral, subrounded and/or embayed characteristics. Chlorite (? after biotite) is intergrown with the quartz aggregate.

The chlorite domains are clouded with fine secondary titania minerals and relicts of magnetite characteristic chloritised biotite. Accessory grains of orthite (allanite) occur locally in these areas, and indicate an incipient pegmatite-like mode of occurrence. (This mineral is moderately radio-active).

KR 1108 Contd.

Minor plagioclase, commonly altered to clay-sericite is scattered. However in one quarter of the rock, plagioclase and coarse biotite is more or less porphyritic in micro-crystalline quartz, potash felspar mosaic.

The confused textures and small sample size tends to limit the scope for a positive identification, however the evidence suggests a biotite rich, incipient pegmatitic differentiate within a fine porphyritic "granite", with subsequent (deuteric) chloritic alteration of biotite and less extensive clay-sericite alteration of plagioclase.

KR 1117: biotite quartz plagioclase porphyry of rhyolitic composition; flow aligned phenocrysts; complete selective sericite replacement of plagioclase phenocrysts, and epidote-chlorite replacement of biotite

Field note: andesitic ? quartz felspar ferromag porphyry

The homogeneous random mosaic of microcrystalline groundmass in this rock, composed of essential quartz and potash felspar, with subordinate sericite and fine biotite, also the minor biotite phenocrysts (7-10%), are all characteristic of many samples in this suite classified primarily as "porphyry".

The biotite is extensively altered to clouded epidote, generally plus chlorite, green chlorite and titaniferous granules.

Subrounded and embayed quartz phenocrysts (15%), and sericite pseudomorphs after plagioclase (20-25%), and rare orthoclase crystals are scattered with similar orientation, indicative of flow alignment not generally obvious in the other "porphyries".

KR 1153: sheared biotite quartz felspar porphyry of rhyolitic composition; extensive sericitic alteration of felspar phenocrysts, and chloritic alteration of biotite; accessory allanite, trace pyrite

Field note: andesitic porphyry - tuff lava

This is a sheared porphyry which may be related to KR 1117 immediately above, and to other "porphyries" in the suite. Phenocrysts consist of stressed, subrounded and embayed quartz crystals (15%), plagioclase crystals (20-25%) virtually completely replaced by sericite, altered biotite (20%), and accessory relatively unaltered orthoclase crystals (7-10%).

These occur in the fairly distinctive primary microcrystalline mosaic groundmass of essential quartz and potash felspar, as described in the "porphyries" above. The sericitised felspar phenocrysts, biotite and local areas in the groundmass are drawn-out and/or recrystallised due to shearing. This may have occurred late in the rock's primary history (contemporaneous with late stage alteration), or was superimposed much later.

Accessory small prismatic crystals of allanite are locally clustered. Trace very small crystals of pyrite are scattered.

KR 1188: rhyolitic, pyroclastic flow rock; (crystal vitric tuff with ignimbritic affinities

Field note: rhyolitic porphyry

Abundant euhedral, embayed volcanic quartz crystals (35-40%) up to 3mm across, and subordinate euhedral plagioclase crystals (20%) of similar size are randomly disposed. The plagioclase crystals are selectively argillised and selectively impregnated by limonite. Quartz crystals are commonly stressed and fractured.

These occur through a groundmass of extensively streaky, flow attenuated fiamme of sericite, intimately intergrown with similarly streaky lenses of cryptocrystalline potash felspar. The entire texture is more or less eutaxitic. Extremely fine crystals and angular splinters of quartz are scattered through this matrix.

The rock does indeed have a gross rhyolitic texture. The matrix is altered glass which has had a fairly turbulent flow history, incorporating fine tuff detritus.

The rock is interpreted as a pyroclastic flow rock, a crystal vitric tuff with ignimbritic affinities.

1129: essentially the same as 1266 *biotite quartz felspar porphyry*, chloritised biotite phenocrysts; minor small patchy veins of hydrothermal chlorite ± sericite

Field note: lithic tuff

This rock has essentially same texture and composition as 1266 (and 1284), to the point where a separate description is not warrented.

Several sericitic shear foliae are slightly more advanced than in 1266, and minor patches of fine hydrothermal chlorite ± sericite are locally developed in irregular patchy veins quite apart from deuterically chloritised biotite. The plagioclase phenocrysts, and felspar through the groundmass is essentially unaltered.

KR 1209: lithic crystal tuff of gross rhyolitic composition moderate sericite alteration through the matrix and selectively of the fragments; accessory pyrite in quartz vein and disseminated

Field note: lithic crystal tuff.

Tuffaceous crystal detritus ranging in size from 0.1 to 5mm (35-40%), and volcanic lithic fragments (30%) up to 10mm, are very roughly bedded through an ultra fine matrix composed largely of tuff detritus equivalent to the coarser components, and ? cryptocrystalline, potash felspar, (highlighted by staining).

The tuff detritus consists mainly of quartz crystals (commonly broken) and fragments of rhyolitic lava, with relatively quite minor felspar crystals. The angular and poorly sorted nature of the quartz crystals is characteristic of their tuffaceous origin.

The lithic fragments consist mainly of glassy rhyolitic-lava, showing pervasive clay-sericite alteration and rarely porphyritic, also of elongated sericitic "patches".

Accessory oxidised pyrite occurs mainly within a quartz vein (apparently of late volcanogenic origin) and several grains of pyrite are disseminated.

KR 1228: pyroclastic flow rock, (i.e. tuff-lava), of rhyolitic composition; extensive clay-sericite alteration of matrix and felspar crystals

Fieldlname: quartz felspar porphyry (rhyolite)

Coarse crystals in this rock measure between 0.3 and 3mm across, and consist of quartz (35%), variably subhedral to subrounded-embayed, and rare angular grains (? splinters); potash felspar (35%) ? subhedral to euhedral but almost completely altered to clays and minor extremely fine sericite; ? plagioclase (? 10%) completely argillised.

Minor oxidised flakes of biotite (5-7%), are scattered. Trace zircon and (oxidised) magnetite are disseminated.

In thin section quartz is the only clearly defined component. The extensively altered felspar crystals are virtually impossible to distinguish from the general matrix-groundmass of clays, shredded and patchy fine sericite and ultra fine silica. Some patches of ultra fine silica appear to be altered glass fragments.

There is no specific, mutually exclusive evidence to distinguish between a tuff or a lava. The reaction coronas around some crystals and relict flow textures in the groundmass indicate a lava. However the quartz splinters, possible glass fragments, and some vague shard textures preserved in the matrix indicates a tuffaceous component.

KR 1234: lithic quartz-felspar crystal tuff; matrix of ultra fine clay-sericite-silica and minor scattered patches of carbonate

Field note: lithic crystal tuff (fiamme)

Abundant quartz crystals (25%), orthoclase crystals (20%), and accessory plagioclase crystals; average size about 0.15mm are variably subhedral, subrounded, embayed and angular (broken). Lithic fragments consist of cryptocrystalline to microcrystalline quartz (? cherty groundmass) carrying small phenocrysts (10%), also minor fragments of quartz-felspar myrmekite are present. The felspars are unaltered.

These components are fairly evenly scattered through a matrix of ultrafine clay silica and fine shredded sericite, also minor scattered patches of carbonate (10%). Apart from the carbonate this matrix has a similar composition to 1276, indicating a similar hydrothermal genesis.

The scattered volcanic lithic fragments is the main basis on which to identify the rock as a tuff.

KR 1226: lithic tuff; composed of microporphyritic rhyolite lava fragments; weak pervasive chloritic alteration and streaky sericite throughout

Field note: lithic crystal tuff (hematite)

This rock consists of numerous microporphyritic volcanic rock fragments within a matrix of essentially the same composition, with the result that it is very difficult to differentiate between the different domains. However the microscopic texture in the groundmass of some fragments, and the intensity of potash felspar (highlighted by staining) is different in different fragments - matrix. Also small biotite phenocrysts are more abundant in some fragments than in others.

Basically all domains consist of a microcrystalline cryptocrystalline groundmass of quartz, potash felspar minor chlorite and fine shredded sericite. These contain abundant deeply embayed phenocrysts of quartz, minor potash felspar and biotite.

Individually and objectively these fragments are rhyolite-lava, fused together as they are, they are interpreted to constitute a lithic tuff.

KR 1263: essentially the same as 1129 (and others) above; biotite quartz felspar porphyry; chloritised biotite phenocrysts, sericitised plagioclase phenocrysts, accessory allanite

Field note; coarse ? andesitic porphyry with abundant ferromags

This rock has essentially the same texture, composition and alteration as the porphyries 1266, 1129 and 1284 described above.

It is probably more closely related to 3180, due to the presence of minor orthoclase crystals which are not apparent in 1266 and 1129.

Scattered biotite phenocrysts (15%) are deuterically chloritised ± titaniferous granules and rare fine ipidote. Plagioclase phenocrysts show slightly more advanced sericitic alteration than in the rocks above, but the fine, ubiquitous potash felspar through the groundmass is essentially unaltered. There is negligible evidence of shear.

Trace small prisms of allanite (orthite) locally accompany altered biotite. (This mineral also reports in samples 1108, and 1284 in this suite).

1266: biotite quartz felspar porphyry; selective chlorite ± fine epidote alteration of biotite, accessory magnetite

Field note: vitric crystal tuff with sulphides

The homogeneous porphyritic texture including biotite phenocrysts are the predominant features about this rock - more obvious in thin section than hand specimen.

Phenocrysts consist of quartz (10-15%), plagioclase (25-30%), biotite (15-20%), and rare potash felspar crystals. Some euhedral (hexagonal) phenocrysts of biotite are present.

These phenocrysts are randomly, but evenly disposed through a microcrystalline groundmass made up of equal amounts of quartz and potash felspar with minor disseminated very fine chlorite (after biotite). Accessory magnetite and titania granules accompany the biotite.

With the exception of deuteric chloritisation of biotite ± fine granular epidote, and moderate sericite clouding of plagioclase the rock is unaltered. Several weak sericitic shear foliae cut the rock.

KR 1270: biotite quartz felspar porphyry, complete selective sericite alteration of felspar and chlorite alteration of biotite phenocrysts; groundmass extensively sheared and sericitised ± chlorite

Field name: lithic crystal tuff

This rock has a somewhat sheared groundmass composed of patchy microcrystalline quartz mosaic, with similarly oriented but otherwise erratic fine shredded and streaky lenses of sericite and minor chlorite throughout. Ultra fine potash felspar is widespread in essential abundance through the quartz-mosaic and fine micas.

Coarse crystals scattered through this groundmass consist of subrounded and embayed quartz crystals (20%) up to 8mm, stressed, fractured and recrystallised; attenuated, rectangular to quadrangular patches of sericite (20-25%) after felspar crystals; and minor flakes of biotite (7-10%), generally extensively altered to chlorite.

The alteration and textural hetrogeneity in this rock is largely caused by shearing. The remnants of microcrystalline 'matrix' is interpreted as an original groundmass as in other "porphyries" described in this suite and the coarse crystals as genuine phenocrysts, rather than tuff crystals.

KR 1276: sheared, rhyolite lava, porphyritic in quartz and orthoclase; original glassy groundmass completely altered to clay-sericite-silica

Field name: coarse porphyritic rhyolite.

Subrounded and embayed phenocrysts of quartz (40%) and euhedral crystals of orthoclase (25-30%), average size about 2mm, are randomly but evenly disposed. They are stressed, and some are dislocated. The felspar crystals are weakly ferruginised (pinkish).

The groundmass is somewhat patchy, but has a fairly uniform gross composition of extremely fine clays, shredded sericite, and fine mottled patches of ultra fine quartz. These materials penetrate fractures through many of the crystals and appear to be largely hydrothermal alteration products after a glassy groundmass. The streaks of sericite are probably tectonic.

KR 1284: biotite felspar quartz porphyry of rhyolitic composition (? high level intrusive), accessory magnetite, allanite, zircon, titania granules

Field note: coarse porphyritic rhyolite ? with quartz felspar and ferromags.

This rock has a clearly defined, homogeneous porphyritic texture, with a distinctive microcrystalline groundmass. Phenocrysts consist of subrounded and deeply embayed quartz (30%), weakly sericitised plagioclase (15-20%) and chloritised biotite (15-20%). Accessory magnetite is disseminated, commonly associated with biotite. Accessory allarite (orthite) zircon and titaniferous granules accompany the altered biotite.

The groundmass consists of a microcrystalline mosaic of potash felspar, subordinate to minor quartz (? plagioclase) and sparse disseminated chlorite.

This is a porphyry with a rhyolitic composition. There is no evidence diagnostic of an extrusive origin, indeed the lack of any flow textures in the microcrystalline groundmass, also the random distribution of phenocrysts, and composition of the accessory minerals indicates a likely high level (? dyke or sill) intrusive.

KR 1289: felspar quartz crystal ash flow tuff; complete clay-sericite (and pale chlorite-biotite) replacement of felspar crystals and of original glassy matrix.

Field note: quartz crystal ash flow tuff.

Potash felspar is absent. Subrounded, variably embayed and some broken quartz crystals (20-25%) average size 0.5mm and clay-sericite pseudomorphs after felspar (30%) of similar size, are randomly disposed through an extremely fine matrix.

The matrix consists of diffuse microcrystalline to virtually cryptocrystalline silica, intimately mixed with irregular streaky, shredded and flame-like patches of pale chloritised 'biotite', and clay-sericite. Local textures indicate original turbulent flow in a glassy medium.

The petrography thus confirms the field identification of quartz crystal ash flow tuff, but original felspar crystals were also present.

KR 1302: glassy rhyolitic lava, weakly porphyritic in quartz and felspar; widespread hydrothermal clay-sericite alteration, superimposed sericitic foliae

Field note: quartz felspar porphyry (rhyolite)

Small (0.5mm), subrounded quartz crystals (7-10%), and ghost like clay-sericite replicas after small felspar crystals (7-10%) are scattered through a basically micro-crystalline groundmass. Minor, coarse, (oxidised) biotite flakes (2-3%) are also present.

The quartz crystals are commonly sub to euhedral, embayed and rarely, partly enclosed by an apparent reaction corona of "authigenic" quartz.

The groundmass consists of a diffuse, micro mottled mosaic of quartz intimately mixed with cryptocrystalline potash felspar and ultra fine dispersed, ? sericite - pale biotite. Several small concentrations of clouded biotite are commonly accompanied. Shredded parallel foliae of metamorphic sericite occur sporadically through the rock.

KR 1322: probable glassy rhyolitic lava, possible pyroclastic flow rock composed essentially of rhyolitic lava sericite widespread through matrix and selectively replaces accessory felspar phenocrysts

Field note: lithic tuff

There is no conclusive evidence of a fragmental texture in this rock which may confirm the field name; indeed its (altered) glassy groundmass, is very similar to the groundmass in 3275. It is slightly more patchy than in that sample, but this appears to reflect heterogeneities in a glassy lava groundmass, rather than discrete lapilli or ash fragments.

Subhedral to euhedral and embayed quartz crystals (15-20%) and accessory sericitised plagioclase crystals are randomly scattered. These occur in a groundmass of diffuse microcrystalline quartz mosaic, intimately mixed with finer (cryptocrystalline) potash felspar, and local streaks of fine sericite. Some quartz crystals are shrouded by small flame-like quartz coronas - a lava characteristic, others are fractured and dislocated - a tuff characteristic.

The rock is identified as a probable glassy rhyolitic lava, or possibly a pyroclastic-flow rock composed essentially of rhyolitic lava.

KR 1330: rhyolitic lava or quartz crystal tuff; sheared and dislocated; complete pervasive replacement through matrix and fractures, by sericite in part of the rock and ultra fine potash felspar in another

Field note: vitric crystal lithic tuff.

This rock has been sheared and pervasively altered. However relict subrounded, extensively embayed and commonly dislocated quartz crystals (35-40%), up to 5mm, minor plagioclase and orthoclase crystals (both about 5%), form a random, loose packed aggregate in an ultra fine matrix. Many clearly defined quartz crystals are surrounded by irregular mottled "authigenic" quartz overgrowths, within the matrix, but which appear to be a primary crystallisation feature, in a lava, rather than in a tuff in which matrix and single coarse quartz crystals are relatively more remotely associated.

In about 2/3 of the rock, ultra fine sericite is ubiquitous as a matrix, and penetrating all fractures within coarser crystals. Ultra fine (cryptocrystalline) potash felspar, plus an extensive ultra fine network of sericite occupies the matrix and fills fractures in the other 1/3 of the sample.

Veins of microcrystalline orthoclase cut the rock.

It is not certain if this is an original crystal tuff or lava. On the basis of the quartz overgrowths it would appear to be a lava. It is primarily very similar to 1228.

KR 1364: (vitric) crystal lithic tuff; indigeneous sericitic-siliceous alteration products in matrix

Field note: crystal vitric tuff

The petrography essentially confirms the field name, although there are significant siliceous rock fragments (ash). Angular splinters of volcanic quartz crystals (15%), minor subrounded-embayed quartz crystals (7%), glassy acid volcanic rock fragments (20%), minor oxidised biotite flakes are vaguely layered through an ultra fine matrix.

The matrix consists of sericite intimately mixed with cryptocrystalline silica, accessory chlorite and minute quartz splinters. These components are alteration products after acid glass. The rock is distinctive in that it is noticeably less potassic than most rocks above.

The matrix is weakly sheared to give rise to minor shredded streaks of sericite.

KR 1374: (lithic) crystal tuff of essentially rhyolitic composition; green biotite replaces minor hornblende crystals, fine sericite-chlorite throughout siliceous-potassic matrix

Field note: dark green vitric lithic crystal tuff

Variably subrounded to subhedral and commonly angular (broken) volcanic quartz crystals ranging from small splinters (0.01mm) to large crystals (2.8mm), form about 35% of the rock. These crystals, together with minor potash felspar crystals (10%), biotite pseudomorphs after small hornblende crystals (5-7%), and several acid volcanic fragments, are all vaguely layered through an extremely fine matrix.

This matrix consists essentially of ultra fine potash felspar and sericite, with equally fine chlorite and micro-mottled, diffuse quartz, erratically scattered throughout.

KR 1386: biotite quartz felspar porphyry; complete pervasive sericitic replacement of felspar phenocrysts and of groundmass felspar; accessory fine magnetite

Field note: dark tuff sediment, sulphides

This rock has a homogeneous, relict porphyritic texture, the same as the "porphyry" group of rocks described above. All felspar however, i.e. phenocrysts and groundmass has been completely pervasively sericitised.

Subrounded to euhedral and embayed quartz phenocrysts (15%), some are partly shrouded in a quartz corona. Somewhat shredded flakes of biotite (10%), completely altered to near opaque titania minerals are similarly oriented, as in the flow textured porphyry 1117 above.

Patches of concentrated sericite represent completely altered felspar crystals.

These components occur in a microcrystalline mosaic of quartz, with an evenly dispersed similar abundance of sericite after primary groundmass felspar. Accessory fine magnetite is dispersed.

KR 3033: lithic, crystal tuff of rhyolitic composition fairly extensively sheared with the development of streaky sericite-biotite foliae through the matrix

Field note: dtreaky andesitic ? quartz felspar porphyry

This is a massive rock cut by closely spaced streaky, variably continuous foliation planes manifest as sheared-out, sericitic and fine biotitic, braided foliae through the matrix.

Subrounded and embayed quartz crystals (25-30%), subhedral crystals of plagioclase (15-20%), and potash felspar (10-15%), minor splinters of these crystals, and minor microcrystalline to cryptocrystalline, quartzo felspathic fragments (15%), are all randomly scattered more or less along the shear planes. The felspars show incipient clay-sericite alteration.

These components are all stressed, and occur in a groundmass of ultra fine quartz, chlorite and ultra fine potash felspar (highlighted by staining), together with the streaky and shredded, sericitic-biotitic foliae noted above.

In view of the minor lithic fragments, splinters of quartz and felspar crystals, and vaguely layered nature of the coarse components (in spite of the shearing) the rock is identified as a tuff. Its essential quartz and potash felspar indicates a closer affinity to rhyolitic, rather than andesitic composition.

KR 3045: volcanic breccia within a rhyolitic (biotite) felspar quartz porphyry; moderate sericite chlorite accessory carbonate and pyrite alteration through the fracture network

Field note: lithic crystal tuff

This rock is composed of a tightly packed and somewhat heterogeneous aggregate of rhyolite porphyry fragments, with essentially the same characteristics as in the 'porphyry' group of rocks described in this report. These fragments are fairly extensively stressed, partly recrystallised and fractured; but primarily they consist of prominant quartz phenocrysts, lesser, smaller plagioclase and chloritised biotite, scattered through a microcrystalline mosaic of quartz and potash felspar.

A random fracture network, fairly extensively sericitised and with associated chlorite, accessory carbonate and pyrite is the dominant manifestation of the fragmental. The rock is a breccia, probably a primary volcanic breccia, with primary (volcanogenic) alteration. It is not apparently a tuff-like fragmental as for example in 3070.

KR 3070: crystal lithic tuff of gross rhyolitic composition; accessory biotite hornblende trace pyrite; sporadic, moderate, chlorite sericite epidote alteration

Field note: vitric crystal lithic tuff

This is a pyroclastic rock, containing a higher proportion of clearly defined volcanic rock fragments than almost any other sample in the suite. These fragments have a porphyritic rhyolite composition, with phenocrysts of quartz potash felspar, minor biotite and accessory hornblende. The groundmass is sheared and apparently relict flow textured, fine sericitic-silicic. Moderate chlorite sericite and fine granular epidote alteration is sporadic.

Fragments of microcrystalline quartz mosaic, clusters of small plagioclase crystals, and larger virtually independent quartz crystals are scattered, and more or less bedded with the fragments.

The rock is clearly a crystal lithic tuff. Although altered glassy material occurs as a groundmass within the fragments, and between fragments the qualifying term vitric is not justified.

3119: "glassy-rhyolitic" lithic tuff; extensive extremely fine sericitic and minor biotitic alteration through groundmass of fragments, and to a limited degree between fragments + hematite

Field note: dark green lithic tuff (hematite)

This rock consists of a tightly packed, more or less fused and roughly bedded aggregate of volcanic rock fragments of very similar composition, average size about 2mm. These fragments consist of patchy diffuse microcrystalline to cryptocrystalline mosaic of potash felspar, subordinate quartz and extremely fine sericite and biotite, as an essential groundmass to minor scattered volcanic quartz crystals.

The patchy streaky and flame-like texture in the groundmass of the fragments indicates turbulent flow. Felspar crystals appear to have been absent. Some fragments are relatively more siliceous than others.

Areas between fragments tend to consist of the same hydrothermal alteration products after the glassy material, which forms the bulk of the fragments, however locally there is a relative concentration of sericite and/or fine quartz with associated hematite. This is a tuffaceous equivalent of 3155 and 1302.

KR 3141: (quartz felspar) porphyritic rhyolite, selective sericitic and minor silicic alteration of plagioclase phenocrysts; groundmass essentially selicic potassic glass, sheared with moderate shear-sericite

Field note: quartz felspar rhyolitic porphyry.

This rock is sheared, but primary minerals and textures are fairly well preserved; in particular the groundmass is dominated by sheared cryptocrystalline glassy material, rather than the microcrystalline groundmass of KR 1284 type rhyolitic porphyry.

Quite extensively embayed quartz crystals (20-25%), and lesser plagioclase (15%) are randomly scattered. The plagioclase is fairly extensively sericitised, and some are partly silicified.

The groundmass consists of clouded, cryptocrystalline potash felspar (largely indicated by staining), with subordinate extremely fine micro-mottled quartz scattered throughout, and minor shredded, braided network of sericite cutting through it.

Trace zircon crystals are scattered and accessory limonite replicas after pyrite occur locally.

The groundmass in this rock is interpreted to be largely after glass which indicates a fairly definite extrusive (rhyolitic) porphyry as distinct from the probqble intrusive type of 1284.

KR 3155: glassy rhyolitic lava with only sparse small quartz phenocrysts

Field note: vitric crystal tuff

Staining indicates that potash felspar is absent.

Basically it consists of small (1mm) subrounded to subhedral quartz crystals (10%), not noticeably embayed, randomly scattered through a quartz-sericite matrix. Minor completely argillised felspar crystals (5%) are also present.

The matrix consists of a diffuse microcrystalline to cryptocrystalline mass of quartz, sericite and minor clay. The sericite is commonly in attenuated, wavy and shredded lenses.

This groundmass has almost certainly devitrified glass, and the wavy network of sericite probably reflects primary fluidal structures. With this inherent element of flow it appears that the rock is more representative of a lava rather tuff, (however the nature of the phenocrysts are different from phenocrysts in other lavas e.g. 3141. This rock is very similar to 1302, and 3119 is a distinctly fragmental, tuffaceous equivalent).

KR 3180: sheared; plagioclase, quartz, orthoclase porphyry, (rhyolitic composition)

Field note: coarse porphyry (andesitic affinities)

Phenocrysts scattered through this rock generally measure about 4mm across, but some orthoclase phenocrysts measure up to 18mm. They consist of quartz crystals (15%), plagioclase 15%, orthoclase (20%); biotite (7-10%). The quartz and felspar crystals are stressed and some are fractured, with groundmass permeating the fractures. The plagioclase and some orthoclase crystals are almost completely replaced by sericite. The biotite is replaced by chlorite.

These components are randomly disposed through a groundmass of microcrystalline quartz and potash felspar (in similar abundance), with minor plagioclase and biotite.

The various potassic phases are highlighted by staining, and considered together with the essential quartz indicates a rhyolitic composition.

The composition, texture and alteration in this rock is essentially the same as in 1266 and 1129, except that orthoclase phenocrysts are more prominant.

KR 3209: (biotite) quartz felspar porphyritic rhyolite; flow textured and sheared groundmass; advanced sericitic alteration of felspar phenocrysts and felsic glass

Field note: rhyolitic ? quartz felspar flow banded porphyry

Subrounded to euhedral and embayed quartz phenocrysts (30%) and commonly quite large (6mm) euhedral crystals of potash felspar (20-25%), sericite replicas after felspar phenocrysts (10-15%), also minor altered biotite (5-7%), are evenly disposed.

They occur in a 'matrix' of shredded, streaky sericite alteration products after glass, cutting through, and intimately mixed with clouded ultra fine potash felspar, minor scattered, micromottled quartz. Textures in the groundmass appear to a fairly large extent to represent primary flow, (much the same as in 3275), but superimposed on this, and difficult to distinguish from it is a shear texture, quite probably an advanced manifestation of the shear features seen in 1153.

KR 3221: *sheared*, (crystal) vitric lithic tuff of essentially rhyolitic composition, ubiquitous sericitic, minor chloritic and silicic alteration, in part due to shearing

Field note: dark green vitric lithic tuff

Objectively most millemetric scale domains in this rock consist of very fine, porphyritic and rhyolitic, glassy lava, in which felspar as phenocrysts, and through the groundmass is largely altered to sericite ± streaky chlorite. A general "patchiness" does indicate that the rock as a whole consists of a fused mass of small fragments of this composition. Indeed slightly larger than normal embayed quartz crystals, and patches of quartz mosaic appear to be essentially independent.

There is therefore fairly conclusive evidence of a primary fragmental texture which justifies the term lithic tuff. That the bulk of each domain consists largely of altered glass probably justifies the term vitric, however there is no evidence of eutaxitic texture or glass shards.

Superimposed shearing has enhanced the sericite and chlorite streaks through the altered groundmass materials.

KR 3241: sericitic quartzite with recrystallised siliceous matrix (largely a derived volcaniclastic sediment)

Field note: quartzite

This is a fairly massive quartzitic rock, with a bedding - weak foliation manifest as minor, commonly - aligned flakes of muscovite. It consists of a tightly packed, albeit fairly poorly sorted, bedded aggregate of generally angular quartz grains in a matrix of diffuse microcrystalline to cryptocrystalline, recrystallised quartz mixed with minor sericite.

Some of the quartz grains are polycrystalline and may be fragments of quartzite or vein-quartz. The majority of quartz grains however are "single" and would appear to be derived from volcanic quartz as represented by phenocrysts and tuff crystals in the volcanic rocks, in this suite, but abraded and fractured during transport.

To this extent it may be considered a derived, or erosional volcaniclastic sediment.

KR 3273: lithic crystal tuff (of gross rhyolitic composition) including some lapilli of rhyolite up to 10mm in size

Field note: lapilli tuff.

This is a lithic crystal tuff, in which some fragments measure up to 10mm across. These larger fragments consist of porphyritic rhyolite, in which the groundmass consists of feathery - spherulitic potassic glass (highlighted by staining), with quartz and plagioclase phenocrysts. Smaller fragments are also vaguely porphyritic but have a cryptocrystalline quartz-potash felspar groundmass. Fragments form about 30% of the rock.

Quartz crystals (20-25%) are variably subrounded to subhedral, embayed, and some are broken. They have an average size of about 1mm and have a random, although vaguely bedded distribution. Generally euhedral crystals of plagioclase (10-15%) and orthoclase (15%) have a similar mode of occurrence as quartz, they are virtually unaltered.

All these components occur within a matrix of ultra fine potash felspar, quartz, shredded sericite and minor chlorite.

KR 3275: flow-textured, very glassy porphyritic rhyolite lava, complete selective sericitic alteration of plagioclase phenocrysts, and sericite ubiquitous through glassy groundmass

Field note: flow banded, rhyolitic quartz felspar sericite porphyry

Subhedral to euhedral and embayed quartz phenocrysts(30%), and completely sericitised crystals of plagioclase (15-20%) of similar size, are evenly scattered with similar orientation through an altered homogeneous glassy matrix.

The groundmass consists of diffuse-micro mottled, microcrystalline quartz mosaic, scattered through near isotropic ultra fine potash felspar largely indicated by staining, intimately mixed with "sericitic" alteration materials after glass. The sericite displays characteristic, micro variolitic and spherulitic fluidal textures.

KR 3280: porphyritic rhyolite, weak sericitic alteration (selectively replacing felspar) accessory ferruginised ? carbonate or hornblende crystals

Field note: rhyolitic porphyry

This rock has a homogeneous texture and composition. Subhedral to euhedral and commonly embayed quartz crystals (30%), partly sericitised plagioclase (20%) and accessory coarse muscovite flakes and selectively ferruginised ? carbonate or hornblende crystals, are all evenly disposed.

The groundmass consists of diffuse cryptocrystalline to microcrystalline potash felspar crowded with abundant small (0.1mm) somewhat mottled allotriomorphic, and rarely, vaguely spherulitic quartz, almost certainly after glass. Minor streaky sericite is also scattered through the groundmass, locally it outlines vague fluidal textures.

The petrography essentially confirms the field name, and indicates weak sericite alteration.

KR 3360: (? plagioclase or cordierite), muscovite garnet sericite quartz schist

Field note: vitric crystal tuff

This is a metasediment. It consists essentially of fine granoblastic quartz mosaic, intimately intergrown with a similar abundance of variably continuous foliae of sericite studded with abundant small muscovite flakes.

Subhedral porphyroblasts of garnet (15-20%) average size 1mm and crystals of partly chloritised ? cordierite or ? plagioclase (10%) are randomly scattered. The garnets are pale pink in hand specimen.

SAMPLE NUMBER	ROCK SAMPLE GEOCHEMICAL RESULTS										
	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Fe %	Mn ppm	Cd ppm	As ppm	Sn ppm	Ba ppm	Au ppb
KR 1236	10	<20	100	<2	3·9	1750	<2	10	5		
1238	25	<20	50	<2	4·6	450	<2	<5	30		
1239	10	<20	170	<2	3·1	1440	<2	<5	10		
1246	2	<20	25	<2	1·18	50	<2	<5	10		
1272	5	<20	10	<2	1·15	100	<2	<5	5		
1294	40	<20	55	<2	3·1	50	<2	<5	20		
1295	2	<20	50	<2	3·4	120	<2	<5	3		
1301	5	<20	90	<2	2·9	2250	<2	<5	1		
1302	<2	<20	50	<2	1·60	90	<2	<5	1		
1303	10	<20	160	<2	2·6	400	<2	<5	<1		
1304	10	<20	300	<2	2·6	680	<2	<5	3		
1305	20	<20	260	<2	3·1	530	<2	<5	10		
1306	5	<20	190	<2	3·2	660	<2	<5	30		
1310	5	<20	70	<2	0·55	60	<2	<5	5		
1314	5	<20	40	<2	1·22	100	<2	<5	3		
1319	2	<20	20	<2	1·70	40	<2	<5	5		
1321	5	<20	15	<2	1·49	100	<2	<5	3		
1347	5	<20	25	<2	4·6	60	<2	<5	20		
3099	50	<20	110	<2	2·2	190	<2	<5	5		
3101	<2	<20	10	<2	5·4	50	<2	<5	<1		
3102	5	<20	10	<2	9·7	80	<2	<5	<1		
3104	5	<20	20	<2	7·6	50	<2	<5	<1	200	
3107	5	<20	10	<2	18·4	30	<2	<5	<1	50	
3110	2	<20	15	<2	3·2	50	<2	<5	5		
3116	220	<20	180	2	45·0	760	<2	<5	<1		
3118	320	<20	240	<2	37·0	930	<2	<5	<1		
3119	10	<20	60	<2	21·0	170	<2	<5	<1		
3120	120	50	70	<2	36·0	120	<2	<5	3		
3121	170	20	140	<2	18·7	220	<2	<5	<1		
3124	10	<20	260	<2	2·4	240	<2	<5	3		
3130	10	<20	20	<2	1·38	30	<2	<5	<1		
3134	10	<20	10	<2	1·98	60	<2	<5	<1	100	
3136	10	<20	10	<2	19·8	100	<2	<5	5	100	
3137	5	<20	15	<2	6·2	30	<2	<5	<1		
3141	5	<20	95	<2	2·7	670	<2	<5	<1		
3156	25	<20	590	<2	1·45	120	<2	40	5	500	<20
3155	5	<20	75	<2	2·9	220	<2	30	10		
3157	10	<20	30	<2	2·5	50	<2	30	<1	500	<20
3158	50	<20	160	<2	3·1	180	<2	20	10	-	
3166	10	<20	15	<2	1·17	90	<2	<5	<1		
3167	5	<20	10	<2	2·2	140	<2	<5	<1		
3168	10	<20	10	<2	2·5	180	<2	<5	<1		
3169	2	<20	10	<2	2·4	70	<2	<5	3		

ANALYTICAL METHOD: Cu, Pb, Zn, Ag, Fe, Mn and Cd by AAS following hot conc. HCL leach and HCL/HNO3 leach in latter stages for 1 hour of 0·25g sample.
Au* by Special Low Level CRA/AAS.
As by modified Gutzeit method.
Sn and Ba* by Emission Spectrography Schemes ES 2 and 3.
* where applicable.

251176

OPERATION OF LEGEND:

1. Capital letter — indicates primary classification eg. S = sedimentary rock, A = acid rock, M = basic rock.
2. Lower case letters — indicate the following:
   (i) Colours — e.g. pk/grn A = pink fragments in an acid igneous rock with a green matrix.
   (ii) Textural or structural features — e.g. xtlA = crystal tuff of acid composition, e.g. pA = porphyric acid rock, e.g. aaA = oxidised acid rock.
   b. As suffixes in progressive order:
   (i) Categorised — e.g. pArf = rhyolite, eg. Ia = intermediate rock of andesitic composition.
   (ii) Mineralogy — e.g. pArf = porphyritic (rhyolite) with feldspar phenocrysts, e.g. tst f/b = lithic crystal tuff with feldspar (phenocrysts component) and biotite (prominent matrix component), e.g. tst f q = lithic crystal tuff with (major) feldspar crystals and (minor) quartz crystals, e.g. fb mg pArpfr (black specks in flow banded porphyritic rhyolite with quartz (major phenocryst component, size range 1mm - 5mm), feldspar (minor phenocryst component), sericite (prominent matrix component), and black specks (minor undifferentiated accessory mineral).

NOTE: This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots.

SYMBOLS:

IGNEOUS:
A acid igneous unclassified
Ar rhyolite
I intermediate igneous unclassified
Ia andesite
Id dacite
M basic igneous unclassified
My basalt
Md dolerite
Gr granite

SEDIMENTARY:
Sah shale
Sltst siltstone
Sst sandstone
Sqtz quartzite
Scongl conglomerate
Sv volcaniclastic sediment

STRUCTURAL and TEXTURAL:
T tuff unclassified
lt lithic tuff
xt crystal tuff
vt vitric tuff
fb flow banding
p porphyritic
clvd cleaved
shd sheared
ox oxidised
vns veins
lam laminated
brec brecciated

GRAIN SIZE:
fg fine grained (<1mm)
mg medium grained (1mm - 5mm)
cg coarse grained (5mm - 5cm)

STRUCTURAL:
outcrop limit
rubble boundary
interpretative contact
bedding
joint
cleavage
primary foliation
fault
unconformity

COLOURS:
pk pink
grn green
brn brown
ple pale
dk dark
wte white
gry grey
pur purple

SILICATE MINERALOGY:
q quartz
f feldspar
mus muscovite
b biotite
c chlorite
s sericite
cb carbonate
mafics mafics
hb hornblende
sid silicified
ferromag ferromagnesians

SULPHIDE MINERALOGY:
s sulphides
py pyrite
cpy chalcopyrite
ga galena
hm haematite
mag magnetite
gos gossan
limo limonite

MISCELLANEOUS:
TS 3033 Thin section and rock No.
* 1182 Geochemical analysis and rock No.
Grid traverse
Anomaly centre (approximate)
Old workings
Campsite

GEOLOGICAL INTERPRETATION:

Pencil No.			Pencil No.		
19-1	TERT.	(Macquarie Beds)	19-19	€	Porphyritic quartz - feldspar rhyolitic lava. (fbpArpf)
19-6	L. ORDO.	Conglomerate (Owen type), sandstones. (Scongl, Sest)	19-21	€	Feldspar - quartz - biotite porphyry. (cg pArfqb)
19-10	U€?	Granite (Gr)	19-24	€	Vitric quartz - feldspar crystal tuff - lava. (fbvxtqf)
19-13	€	Sandstone (Sest)	19-28	€	Rhyolitic crystal pyroclastics. Crystal tuff, crystal lithic tuff (xtq, xltqf)
19-17	€	Fine grained volcaniclastic sediments. (fg Sv(sst), Sv(Sah),)	19-32	€	Rhyolitic lithic pyroclastics. Lithic tuff, lithic crystal tuff, lithic vitric tuff, (cgltqf, mglstqf, lvtqf)
19-18	€	Coarse grained sedimentary breccia (cg S(brec))	19-70	PRE €	Undifferentiated quartzite, quartz mica schist. (Sqtz, fqlam sch Sah mus.)
19-63	€	Conglomerate (Scongl)			

GEOPEKO LIMITED
KING ISLAND GROUP

SCALE: 1:10,000

No. KT9/74-1 A

E.L. 9/74 001
BIRCH INLET, TASMANIA

GEOLOGICAL MAP

DATE: June 1978
GEOLOGIST: C D S
DRAWN: J R M
CHECKED: M C R

KT9/74
KT9/74-2
KT9/74-3
KT9/74-4

78-1275 Vol. 2/2

SAMPLE NUMBER	ROCK SAMPLE GEOCHEMICAL RESULTS										
	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Fe %	Mn ppm	Cd ppm	As ppm	Sn ppm	Ba ppm	Au ppm
KR 1009	2	<20	10	<2	1·25	110	<2	<5	30		
1034	5	<20	20	<2	1·25	110	<2	10	30		
1057	2	<20	100	<2	2·4	290	<2	10	20		
1089	<2	<20	35	<2	7·6	30	<2	10	100		
1128	5	<20	160	<2	4·8	940	<2	<5	5		
1266	2	<20	110	<2	3·4	730	<2	<5	30		
1267	5	<20	130	<2	4·4	220	<2	<5	20		
3096	15	20	20	<2	6·3	150	<2	<5	5		
3262	20	<20	90	<2	9·1	9800	<2	30	<1		
3277	2	<20	15	<2	0·48	20	<2	<5	<1		

ANALYTICAL METHOD: Cu, Pb, Zn, Ag, Fe, Mn and Cd by AAS following hot conc. HCL leach and HCL/HNO3 leach in latter stages for 1 hour of 0·25g sample.

Au* by Special Low Level CRA/AAS.

As by modified Gutzeit method

Sn and Ba* by Emission Spectrography Schemes ES 2 and 3

* where applicable

OPERATION OF LEGEND:

1. Capital letter – indicates primary classification eg. S - sedimentary rock, A - acid rock, M - basic rock.

2. Lower case letters – indicate the following :
   (i) Colours - e.g. pk/grnA = pink fragments in an acid igneous rock with a green matrix.
   (ii) Textural or structural features - e.g. stA = crystal tuff of acid composition, eg. pA = porphyritic acid rock, e.g. oxA = oxidised acid rock.

b. As suffixes in progressive order:
   (i) Categorised - e.g. pArr = rhyolite, eg. Zo = intermediate rock of andesitic composition.
   (ii) Mineralogy - e.g. pArf= porphyritic (rhyolite) with feldspar phenocrysts, e.g. lst f/b = lithic crystal tuff with feldspar(phenocrysts component) and biotite (prominent matrix component), e.g. ht f-g = lithic crystal tuff with (major) feldspar crystals and (minor) quartz crystals, e.g. fb mg Arqfs (black specks)=flow banded porphyritic rhyolite with quartz (major phenocryst component, size range 1mm - 5mm), feldspar (minor phenocryst component), sericite (prominent matrix component), and black specks (minor undifferentiated accessory mineral).

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots.

SYMBOLS:

IGNEOUS:
A acid igneous unclassified
Ar rhyolite
I. intermediate igneous unclassified
Io andesite
Id dacite
M basic igneous unclassified
Mv basalt
Md dolerite
Gr granite

SEDIMENTARY:
Sch shale
Sstst siltstone
Sst sandstone
Sqtz quartzite
Scongl conglomerate
Sv volcaniclastic sediment

STRUCTURAL and TEXTURAL:
T tuff unclassified
lt lithic tuff
st crystal tuff
vt vitric tuff
fb flow banding
p porphyritic
civd cleaved
shd sheared
ox oxidized
vns veins
lam laminated
brec brecciated

GRAIN SIZE:
fg fine grained (<1mm)
mg medium grained (1mm - 5mm)
cg coarse grained (5mm - 5cm)

STRUCTURAL:
overturning limit
rubble boundary
intergrotative contact
bedding
cleavage
primary foliation
fault
unconformity

COLOURS:
pk pink
grn green
brn brown
gy grey
blk black
drk dark
wte white
gry grey
pur purple

SILICATE MINERALOGY:
q quartz
f feldspar
mus muscovite
b biotite
c chlorite
s sericite
cb carbonate
matics matics
hb hornblende
sid silicified
ferromag ferromagnesians

SULPHIDE MINERALOGY:
s sulphides
py pyrite
cpy chalcopyrite
ga galena
hm hematite
mag magnetite
goe goesan
lim limonite

MISCELLANEOUS:
TS 3033 Thin section and rock No.
* 1112 Geochemical analysis and rock No.
Grid traverse
Anomaly centre (approximate)
Old workings
Campsite

GEOLOGICAL INTERPRETATION:

Pencil No.			Pencil No.		
19-1	TERT.	(Macquarie Beds)	19-19	G	Porphyritic quartz - feldspar rhyolitic lava. (fbpArqf)
19-6	L. ORDO.	Conglomerate(Owen type), sandstones. (Scongl, Sst)	19-21	G	Feldspar - quartz - biotite porphyry.(cg pArfqb)
19-10	U&L ?	Granite (Gr)	19-24	G	Vitric quartz - feldspar crystal tuff - lava. (fb vxtqf)
19-13	G	Sandstone (Sst)	19-28	G	Rhyolitic crystal pyroclastics. Crystal tuff, crystal lithic tuff (xtq , xtqf)
19-17	G	Fine grained volcaniclastic sediments. (fg Sv(sst), Sv(Sch),)	19-32	G	Rhyolitic lithic - pyroclastics Lithic tuff, lithic crystal tuff, lithic vitric tuff, (eq ltqf, mg ltqf, lvtqf)
19-18	G	Coarse grained sedimentary breccia (cg S(brec))	19-70	PRE G	Undifferentiated quartzite, quartz mica schist (Sqtz, fg lam sch Sch mus)
19-63	G	Conglomerate (Scongl)			

GEOPEKO LIMITED
KING ISLAND GROUP

SCALE: 1 : 10,000

No. KT9/74-2A

E.L. 9/74 002
BIRCH INLET, TASMANIA

GEOLOGICAL MAP

DATE: June 1978
GEOLOGIST: C D S
DRAWN: J P M
CHECKED: M C R

KT9/74
KT9/74-2
KT9/74-3
KT9/74-4

251177

78-12-15 Vol. 212.

SAMPLE NUMBER	ROCK SAMPLE GEOCHEMICAL RESULTS										
	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Fe %	Mn ppm	Cd ppm	As ppm	Sn ppm	Bo ppm	Au ppb
KR 1108	10	<20	160	<2	4·4	1210	<2	<5	30		
1109	25	<20	170	<2	5·3	1330	<2	<5	30		
1112	5	<20	140	<2	5·0	1260	<2	<5	5		
1146	15	<20	85	<2	4·6	870	<2	20	200		
1154	20	<20	85	<2	3·5	760	<2	<5	10		
1158	<2	<20	10	<2	2·1	30	<2	<5	10		
1170	5	<20	25	<2	1·52	110	<2	<5	10		
1354	2	<20	55	<2	1·85	170	<2	<5	10		
1373	<2	<20	95	<2	3·8	940	<2	<5	100		
1378	20	<20	120	<2	7·6	1800	<2	<5	30		
1385	5	<20	55	<2	1·30	300	<2	<5	3		
1386	<2	<20	15	<2	1·75	40	<2	<5	<1		

ANALYTICAL METHOD: Cu, Pb, Zn, Ag, Fe, Mn and Cd by AAS following hot conc HCL leach and HCL/HNO3 leach in latter stages for 1 hour of 0·25g sample

Au* by Special Low Level CRA/AAS

As by modified Gutzeit method

Sn and Ba* by Emission Spectrography Schemes ES 2 and 3

*where applicable

5 cm

OPERATION OF LEGEND:

1. Capital letter — indicates primary classification eg. S = sedimentary rock, A = acid rock, M = basic rock.
2. Lower case letters — indicate the following:
   (i) Colours - e.g. pk/grnA = pink fragments in an acid igneous rock with a green matrix.
   (ii) Textural or structural features - e.g. stkA = crystal tuff of acid composition, eg. pkA = porphyric acid rock, eg. oxA = oxidised acid rock.

b. As suffixes in progressive order:
   (i) Categorised - e.g. pArf = rhyolite, eg. Za = intermediate rock of andesitic composition.
   (ii) Mineralogy - e.g. pArf = porphyritic (=rhyolite) with feldspar phenocrysts, e.g. lst f/s = lithic crystal tuff with feldspar(phenocrysts component) and biotite (prominant matrix component), eg. lst f q = lithic crystal tuff with(major) feldspar crystals and (minor) quartz crystals, eg. fb mg ArqfB (black specks)=flow banded porphyritic rhyolite with quarta (major phenocryst component, size range 1mm - 5mm), feldspar (minor phenocryst component), sericite (prominant matrix component), and black specks (minor undifferentiated accessory mineral).

NOTE: This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plate.

SYMBOLS:

IGNEOUS:
- A acid igneous unclassified
- Ar rhyolite
- I intermediate igneous unclassified
- Za andesite
- Zd dacite
- M basic igneous unclassified
- Mv basalt
- Md dolerite
- Gr granite

SEDIMENTARY:
- Sah shale
- Sltst siltstone
- Sest sandstone
- Sqtz quartzite
- Scongl conglomerate
- Sv volcaniclastic sediment

STRUCTURAL and TEXTURAL:
- t tuff undissected
- lt lithic tuff
- st crystal tuff
- vt vitric tuff
- fb flow banding
- p porphyritic
- clvd cleaved
- shd sheared
- sx skidded
- vns veins
- lam laminated
- brec brecciated

GRAIN SIZE:
- fg fine grained (<1mm)
- mg medium grained (1mm - 5mm)
- cg coarse grained (5mm - 5cm)

STRUCTURAL:
- OL outcrop limit
- rubble boundary
- intergrustive contact
- bedding
- joint
- cleavage
- primary foliation
- fault
- unconformity

COLOURS:
- pk pink
- grn green
- brn brown
- pale pale
- dk dark
- wte white
- gry grey
- pur purple

SILICATE MINERALOGY:
- q quartz
- f feldspar
- mus muscovite
- b biotite
- c chlorite
- s sericite
- cb carbonate
- matics matics
- hb hornblende
- sid silicified
- ferromag ferromagnesians

SULPHIDE MINERALOGY:
- py pyrites
- cpy chalcopyrite
- gn galena
- hm hematite
- mag magnetite
- sph sphalerite
- lim limonite

MISCELLANEOUS:
- TS 3033 Thin section and rock No.
- * 1112 Geochemical analysis and rock No.
- Grid traverse
- Anomaly centre (approximate)
- Old workings
- Campsite

GEOLOGICAL INTERPRETATION:

Pencil No.
- 19-1 TERT. (Macquarie Beds)
- 19-6 L. ORDO. Conglomerate(Owen type), sandstones. (Scongl, Sest)
- 19-10 U & ? Granite (Gr)
- 19-13 C Sandstone (Sest)
- 19-17 C Fine grained volcaniclastic sediments. (fg Sv(sst), Sv(Sah),)
- 19-18 C Coarse grained sedimentary breccia(eg S(brec))
- 19-63 C Conglomerate (Scongl)
- 19-19 C Porphyritic quartz - feldspar rhyolitic lava.(fpArqf)
- 19-21 C Feldspar-quartz - biotite porphyry.(cg pArfqb)
- 19-24 C Vitric quartz - feldspar crystal tuff - lava. (fb vstqf)
- 19-28 C Rhyolitic crystal pyroclastics Crystal tuff, crystal lithic tuff (stq, stqf)
- 19-32 C Rhyolitic lithic pyroclastics Lithic tuff, lithic crystal tuff, lithic vitric tuff, (lqtf, lat, mg lstqf, lvtqf)
- 19-70 PRE C Undifferentiated quartzite, quartz mica schist (Sqtz, fglam sch Sah mus.)

GN MN 12°

GEOPEKO LIMITED
KING ISLAND GROUP
251178

SCALE 1: 10,000

No. KT9/74-3A

E.L. 9/74 003

BIRCH INLET, TASMANIA

GEOLOGICAL MAP

DATE: April 1978
GEOLOGIST: C D S
DRAWN: J P M
CHECKED: M C R

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

78-1275 Vol 2/2

SAMPLE NUMBER	ROCK SAMPLE GEOCHEMICAL RESULTS										
	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Fe %	Mn ppm	Cd ppm	As ppm	Sn ppm	Ba ppm	Au ppb
KR 1357	10	< 20	40	< 2	1·68	250	< 2	< 5	30		
1358	2	< 20	50	< 2	2·40	250	< 2	< 5	50		
1372	2	< 20	25	< 2	1·72	310	< 2	20	5		
1377	110	< 20	160	< 2	3·40	970	< 2	< 5	5		
3034	< 2	< 20	15	< 2	0·44	50	< 2	< 5	10		
3046	10	< 20	20	< 2	0·95	30	< 2	20	20		
3047	15	< 20	10	< 2	2·80	10	< 2	30	< 1		
3048	30	< 20	75	< 2	3·20	770	< 2	< 5	< 1		
3050	15	< 20	55	< 2	2·80	370	< 2	< 5	< 1		
3053	5	< 20	15	< 2	0·56	40	< 2	< 5	3		
3055	2	< 20	2	< 2	1·08	50	< 2	< 5	5		
3057	2	< 20	15	< 2	1·78	320	< 2	< 5	5		
3071	5	80	40	< 2	1·13	280	< 2	< 5	1		
3079	10	20	180	< 2	5·70	990	< 2	< 5	5		
3354	5	< 20	10	< 2	6·00	30	< 2	< 5	5		
3371	30	< 20	280	< 2	3·40	240	< 2	< 5	< 1		
3373	40	< 20	20	< 2	2·10	80	< 2	< 5	20		

ANALYTICAL METHOD Cu, Pb, Zn, Ag, Fe, Mn and Cd by AAS following hot conc. HCL leach and HCL/HNO3 leach in latter stages for 1 hour of 0·25 g sample.
Au* by Special Low Level CRA/AAS.
As by modified Gutzeit method.
Sn and Ba* by Emission Spectrography Schemes ES 2 and 3
* where applicable.

OPERATION OF LEGEND:

1. Capital letter — indicates primary classification eg. S = sedimentary rock, A = acid rock, M = basic rock.
2. Lower case letters — indicate the following:
   (i) Colours - e.g. pk/grnA = pink fragments in an acid igneous rock with a green matrix.
   (ii) Textural or structural features - e.g. stkA = crystal tuff of acid composition., e.g. pkA = porphyric acid rock, e.g. oxA = oxidised acid rock.

b. As suffixes in progressive order:
   (i) Categorised - e.g. pArf = rhyolite, e.g. Io = intermediate rock of andesitic composition.
   (ii) Mineralogy - e.g. pArf = porphyritic (=hyalite) with feldspar phenocrysts, e.g. lat f/b = lithic crystal tuff with feldspar(phenocrysts component) and biotite (prominent matrix component), e.g. lat f q = lithic crystal tuff with(major) feldspar crystals and (minor) quartz crystals, e.g. fb mg pArgfc (black specks) = flow banded porphyritic rhyolite with quartz (major phenocryst component, size range 1mm - 5mm), feldspar (minor phenocryst component), sericite (prominent matrix component), and black specks (minor undifferentiated accessory mineral).

NOTE: This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots.

SYMBOLS:

IGNEOUS:
A - acid igneous unclassified
Ar - rhyolite
I - intermediate igneous unclassified
Io - andesite
Id - dacite
M - basic igneous unclassified
My - basalt
Md - dolerite
Gr - granite

SEDIMENTARY:
Sh - shale
Sltst - siltstone
Sst - sandstone
Qtz - quartzite
Scong - conglomerate
Sv - volcaniclastic sediment

STRUCTURAL and TEXTURAL:
f - tuff unclassified.
lt - lithic tuff
vt - crystal tuff
vt - vitric tuff
fb - flow banding
p - porphyritic
clvd - cleaved
shd - sheared
ox - oxidized
vns - veins
lam - laminated
breq - brecciated

GRAIN SIZE:
fg - fine grained (< 1 mm)
mg - medium grained (1 mm - 5 mm)
cg - coarse grained (5 mm - 5 cm)

STRUCTURAL:
- outcrop limit
- rubble boundary
- interpretative contact
- bedding
- joint
- cleavage
- schistosity foliation
- fault
- unconformity

COLOURS:
pk - pink
grn - green
brn - brown
gls - pale
dk - dark
wte - white
gry - grey
pur - purple

SILICATE MINERALOGY:
q - quartz
f - feldspar
mus - muscovite
b - biotite
c - chlorite
s - sericite
cb - carbonate
pf - pacfics - matrix
hb - hornblende
sid - silicified
ferromag - ferromagnesians

SULPHIDE MINERALOGY:
s - sulphides
py - pyrite
cpy - chalcopyrite
gn - galena
hm - haematite
mag - magnetite
gos - gossan
lim - limonite

MISCELLANEOUS:
TS 3033 Thin section and rock No.
* 1112 Geochemical analysis and rock No.
Grid traverses
Anomaly centre (approximate)
Old workings
Campsite

GEOLOGICAL INTERPRETATION:

Pencil No.			
19-1		TERT.	(Macquarie Beds)
19-6		L. ORDO.	Conglomerate (Owen type), sandstones. (Scongl, Sst)
19-10		U € ?	Granite (Gr)
19-13		€	Sandstone (Sst)
19-17		€	Fine grained volcaniclastic sediments. (fg Sv(sst), Sv(Sh),)
19-18		€	Coarse grained sedimentary breccia (cg S(brec))
19-63		€	Conglomerate (Scongl)
19-19		€	Porphyritic quartz - feldspar rhyolitic lava. (fb pArqf)
19-21		€	Feldspar - quartz - biotite porphyry (cg pArfqb)
19-24		€	Vitric quartz - feldspar crystal tuff - lava. (fb vtqf)
19-28		€	Rhyolitic crystal pyroclastics. Crystal tuff, crystal lithic tuff (stq, vtqf)
19-32		€	Rhyolitic lithic pyroclastics. Lithic tuff, lithic crystal tuff, lithic vitric tuff, (lqtf, lvtf, mglatf, lvtf)
19-70		PRE €	Undifferentiated quartzite, quartz mica schist. (Sqtz, fg tom sch Sh mus.)

GEOPEKO LIMITED
KING ISLAND GROUP

SCALE: 1:5000

No. KT9/74-4A

E.L. 9/74 004
BIRCH INLET, TASMANIA
GEOLOGICAL MAP

DATE: MAY 1978
GEOLOGIST: C D S
DRAWN: J F M
CHECKED: M C R

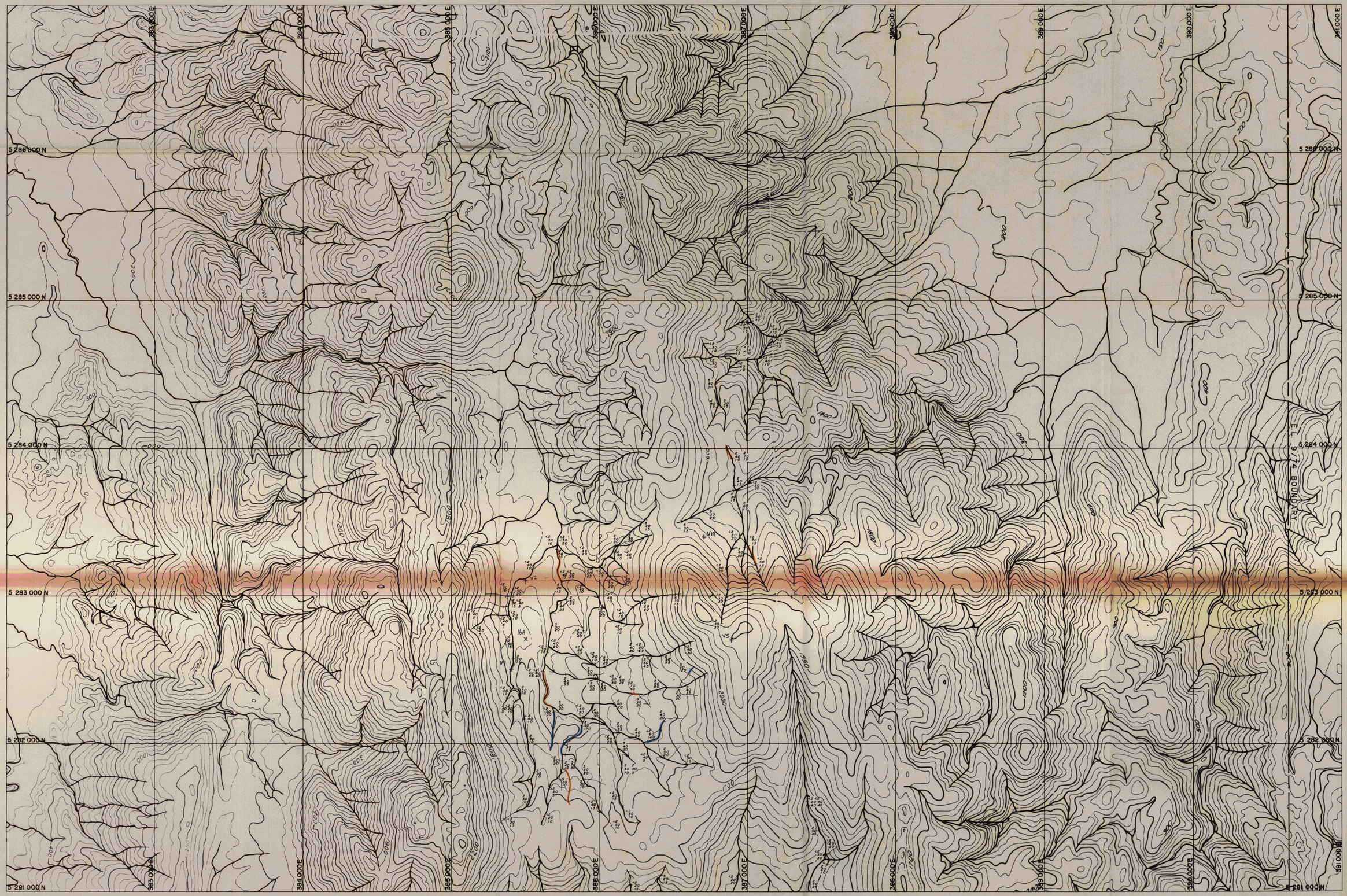
5 cm

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

E.L. 9/74 BOUNDARY

251179

78-1275 Vol 2/2.



LEGEND:

5 Cu ppm
150 Pb ppm
200 Zn ppm

ANALYTICAL METHODS: Cu, Pb and Zn by A.A.S following conc HCL leach and HCL / HNO3 leach in latter stages for 1 hour of 0·25g sample

A. C. S. Laboratories Pty. LTD.

Anomalous Values - Drainage Samples:
(colour marked from sample location upstream to next location)

Copper > 10 p p m (0·7% of total population)
Lead > 70 p p m (1·0% of total population)
Zinc > 100 p p m (1·0% of total population)

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots.

5 cm

DATE: July 1977
GEOLOGIST: C. D. S.
DRAWN: J. P. M.
CHECKED: M. C. R.

GEOPEKO LIMITED
KING ISLAND GROUP

251180

SCALE: 1: 10,000

No. KT9/74-1 B

E.L. 9/74 005

BIRCH INLET, TASMANIA

DRAINAGE GEOCHEMICAL RESULTS

COPPER, LEAD and ZINC

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

TS-1275 Vol 2/2

383 000 E | 384 000 E | 385 000 E | 386 000 E | 387 000 E | 388 000 E | 389 000 E | 390 000 E | 391 000 E

5 280 000 N | 5 279 000 N | 5 278 000 N | 5 277 000 N | 5 276 000 N | 5 275 000 N

INNES PK
TRIG NO. 833
(2179')

E.L. 9/74 BOUNDARY

251181

LEGEND:

50 Cu ppm
100 Pb ppm
200 Zn ppm

ANALYTICAL METHODS: Cu, Pb and Zn by AAS following conc. HCL leach and HCL/HNO3 leach in latter stages for 1 hour of 0·25g sample.

A.C.S. Laboratories Pty. LTD.

Anomalous Values - Drainage Samples:
(colour marked from sample location upstream to next location)

Copper	> 10 p p m		(0·7% of total population)
Lead	> 70 p p m		(1·0% of total population)
Zinc	> 100 p p m		(1·0% of total population)

NOTE
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15 840 scale topographic machine plots.

5 cm

DATE: July 1977
GEOLOGIST: C D S
DRAWN: J P M
CHECKED: M C R

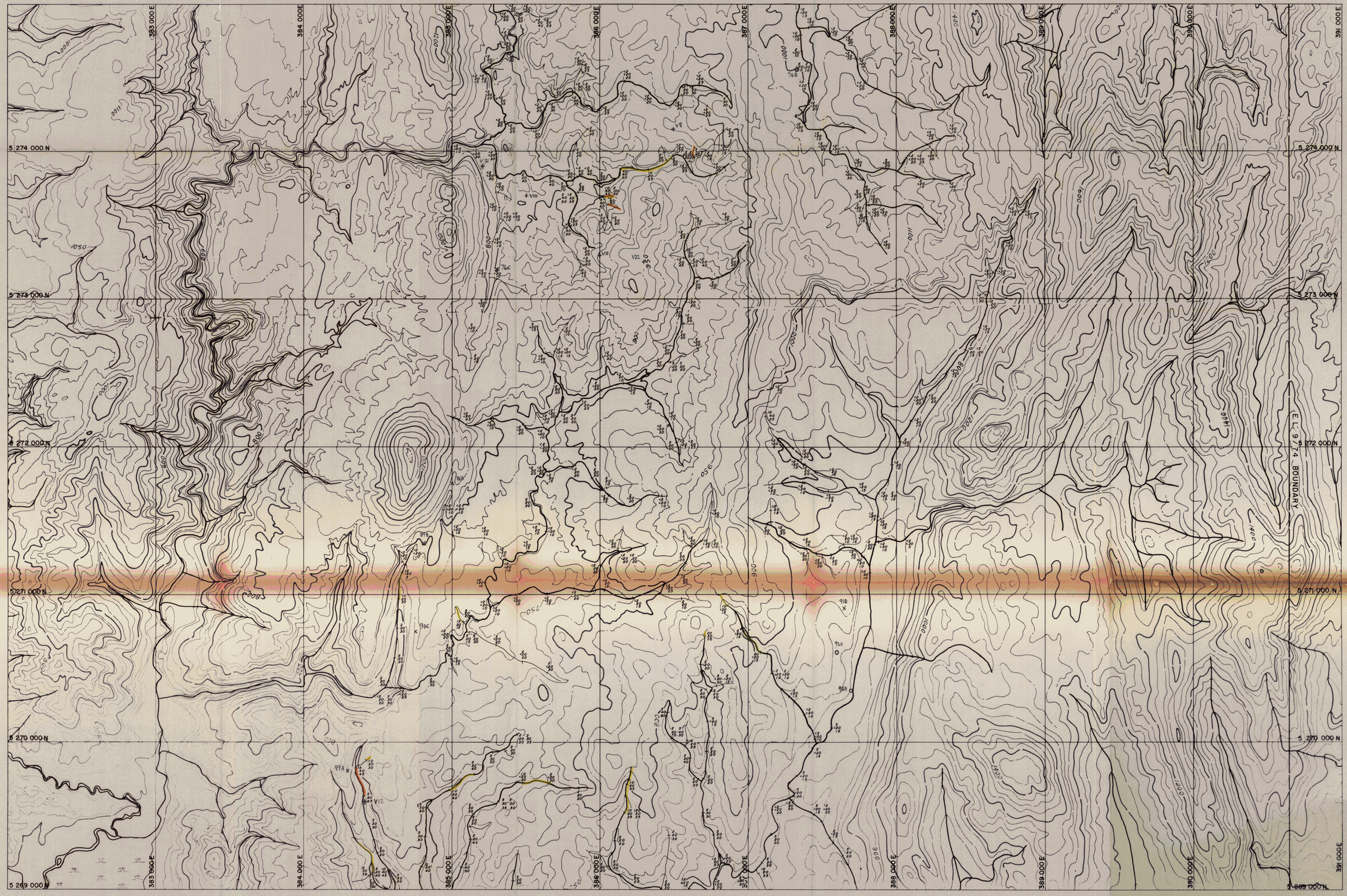
GEOPEKO LIMITED
KING ISLAND GROUP
TS-1275 V2/2

SCALE: 1: 10,000

No. KT9/74-2 B

E.L. 9/74 006
BIRCH INLET, TASMANIA
DRAINAGE GEOCHEMICAL RESULTS
COPPER, LEAD and ZINC

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4



LEGEND:

50 Cu ppm
150 Pb ppm
200 Zn ppm

ANALYTICAL METHODS: Cu, Pb and Zn by AAS following conc. HCL leach and HCL/HNO3 leach in latter stages for 1 hour of 0·25g sample.

A.C.S. Laboratories Pty.

Anomalous Values - Drainage Samples :
(colour marked from sample location upstream to next location)

Copper	> 10 p p m	(0·7 % of total population)
Lead	> 70 p p m	(1·0 % of total population)
Zinc	> 100 p p m	(1·0 % of total population)

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15 840 scale topographic machine plots.

5 cm

DATE: July 1977
GEOLOGIST: C D S
DRAWN: J P M
CHECKED: M C R

GEOPEKO LIMITED
KING ISLAND GROUP
251182

SCALE: 1 10,000

No. KT9/74-3 B

E.L. 9/74 007
BIRCH INLET, TASMANIA
DRAINAGE GEOCHEMICAL RESULTS
COPPER, LEAD and ZINC

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

TS-1215 Vol 2/2

LEGEND:

Cu Pb Zn
200 200 200 ppm

ANALYTICAL METHODS Cu, Pb and Zn by AAS following conc. HCL leach and HCL/HNO_3 leach in latter stages for 1 hour of 0·25g sample.

A.C.S. Laboratories Pty LTD.

Anomalous Values - Drainage Samples
(colour marked from sample location upstream to next location)

Copper	> 10 ppm	(0·7% of total population)
Lead	> 70 ppm	(1·0% of total population)
Zinc	> 100 ppm	(1·0% of total population)

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots.

5 cm

GEOPEKO LIMITED 251183
KING ISLAND GROUP

SCALE: 1:10,000

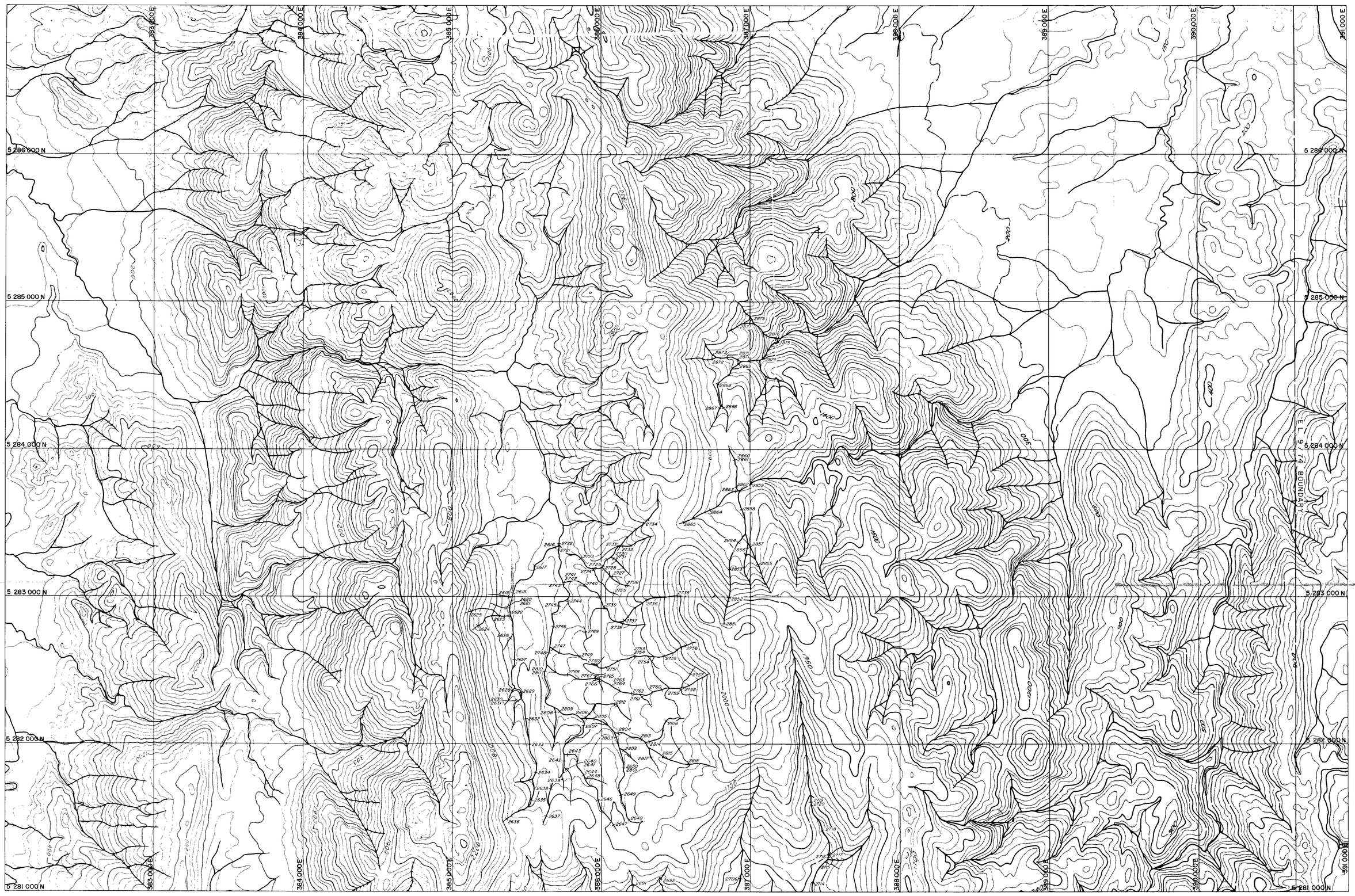
No. KT9/74-4 B

E.L. 9/74 008
BIRCH INLET, TASMANIA
DRAINAGE GEOCHEMICAL RESULTS
COPPER, LEAD and ZINC

DATE: July 1977
GEOLOGIST: C D S
DRAWN: J P M
CHECKED: M C R

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

78-1275 Vol 2/2



251184

LEGEND

– 2627 Drainage sample No KD 2627

– 2630 / 2631 Drainage sample No KD 2630 / Duplicate drainage sample No KD 2631

NOTE
This map has been compiled from enlargements of the Tasmanian Lands Department's 1 : 15840 scale topographic machine plots

GEOPEKO LIMITED
KING ISLAND GROUP
73-1275 Vol 2/3

SCALE 1 : 10,000

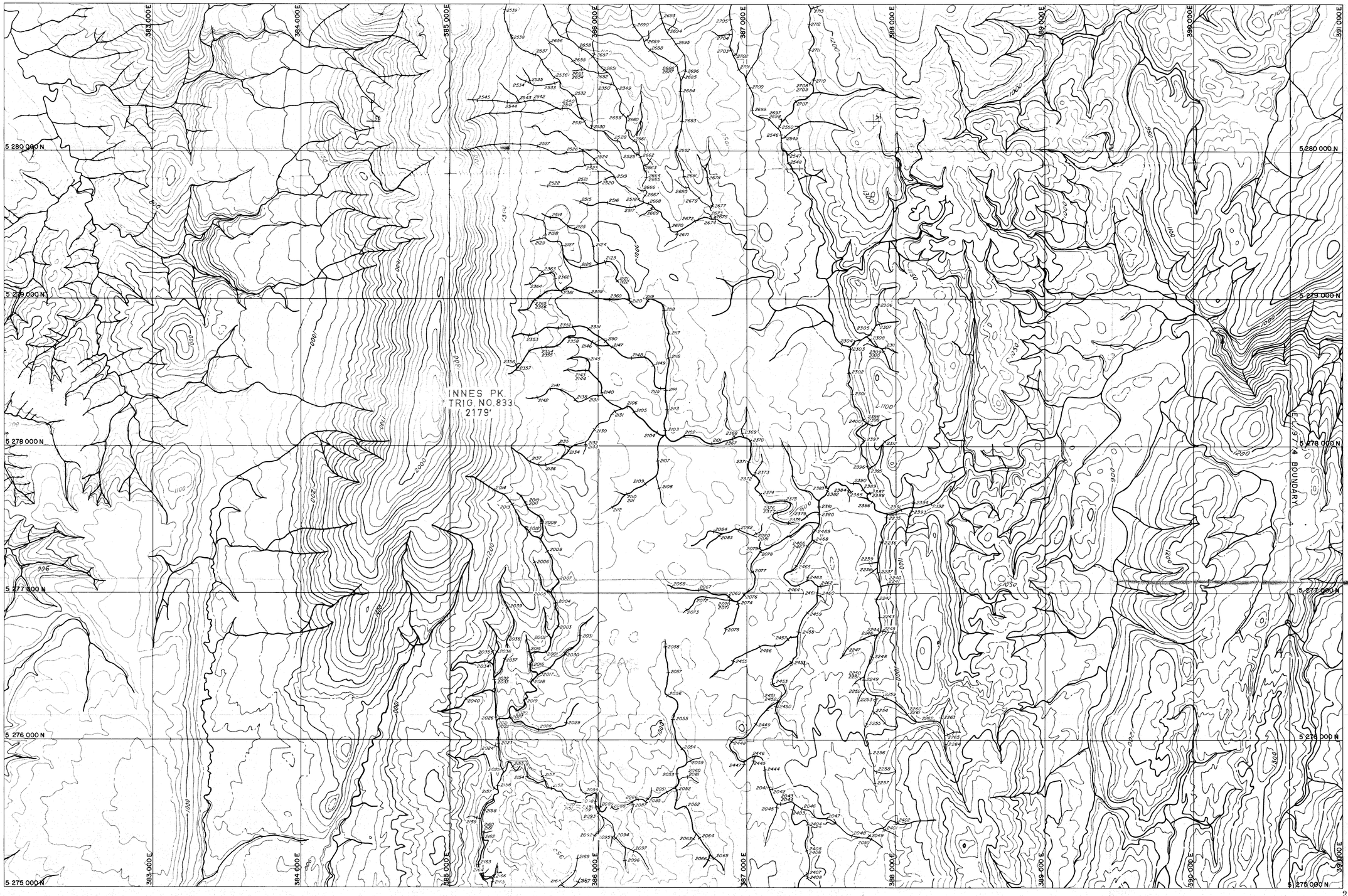
No. KT9/74-IC

E.L. 9/74 009
BIRCH INLET, TASMANIA
DRAWN-L.G.
DRAINAGE SAMPLE LOCATION MAP

DATE August 1977
GEOLOGIST C.D.S. G.L.B.
CHECKED M.C.R.

5 cm

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4



251185

LEGEND:

- 2018 Drainage sample No. KD 2018
- 2021 Drainage sample No. KD 2021
- 2022 Duplicate drainage sample No. KD 2022

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots

GEOPEKO LIMITED
KING ISLAND GROUP

78-1275 Vol 3/2

SCALE: 1:10,000

No. KT9/74-2C

DATE: August 1977

GEOLOGIST: C.D.S. S.L.B.

DRAWN: L.G.

CHECKED: M.C.R.

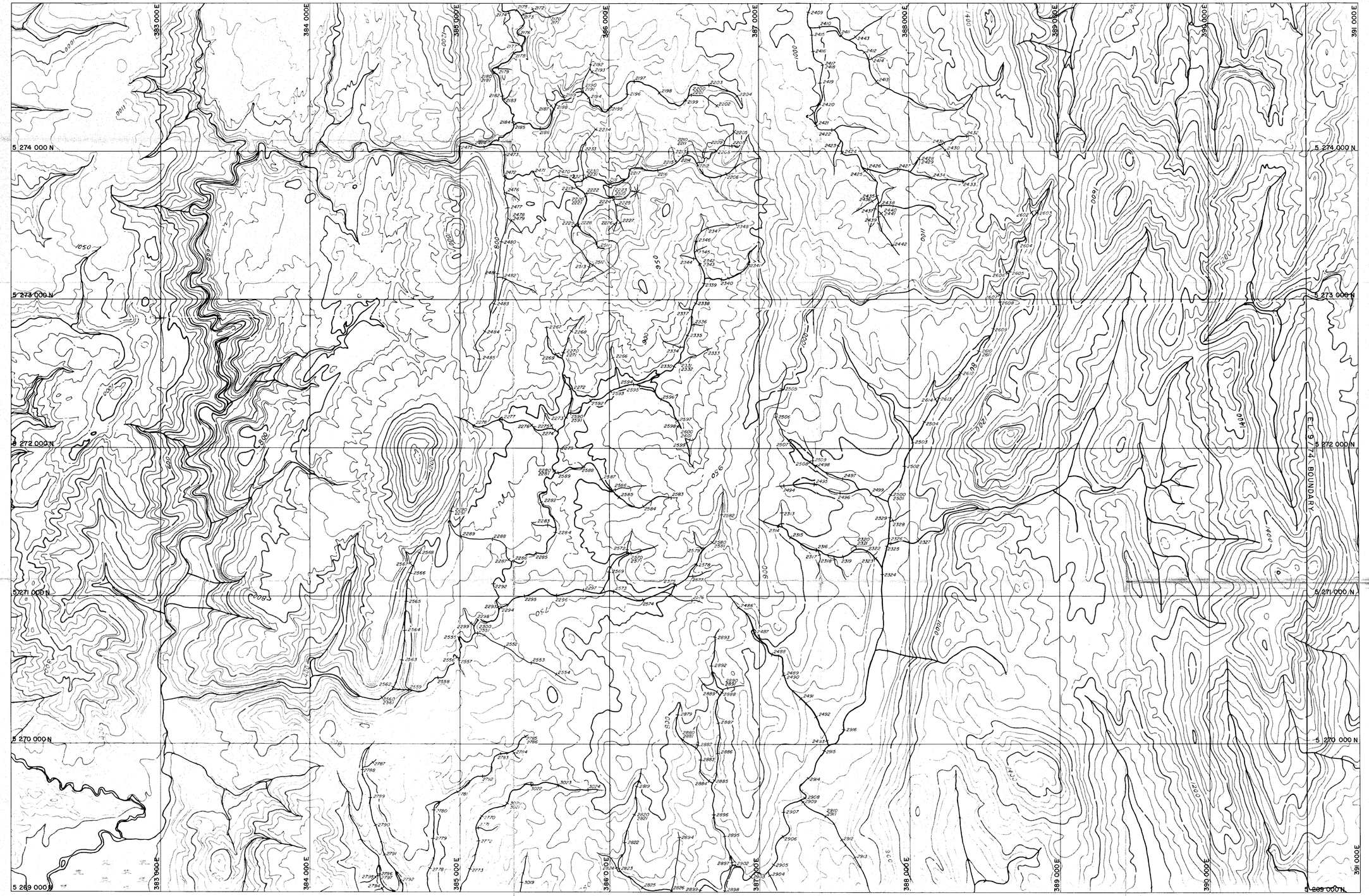
E.L. 9/74 010

BIRCH INLET, TASMANIA

DRAINAGE SAMPLE LOCATION MAP

5 cm

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4



LEGEND:

- 2274 Drainage sample No. KD 2274
- 2280 / 2281 Drainage sample No. KD 2280 / Duplicate drainage sample No. KD 2281

NOTE
This map has been compiled from enlargements of the Tasmanian Lands Departments 1:15840 scale topographic machine plots

251186

GEOPEKO LIMITED
KING ISLAND GROUP

73-125 Vol 2/a

SCALE: 1:10,000

No. KT9/74-3C

E.L. 9/74 011

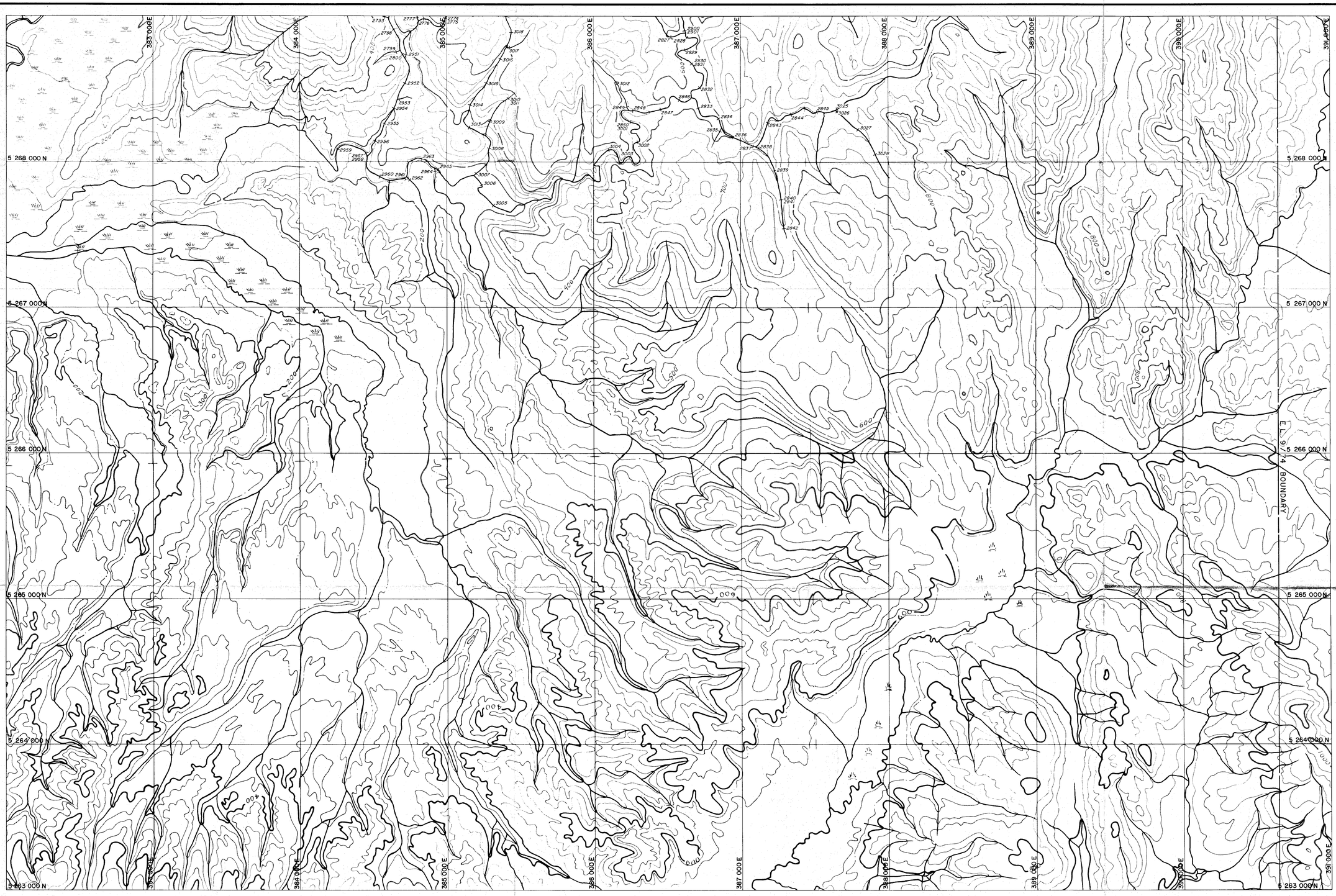
BIRCH INLET, TASMANIA

DRAINAGE SAMPLE LOCATION MAP

DATE: August 1977
GEOLOGIST: C.D.S. G.L.B.
DRAWN: L.G.
CHECKED: M.C.R.

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

5 cm



LEGEND:

- 2835 — Drainage sample No. KD 2835
- 3010 / 3011 — Drainage sample No. KD 3010 / Duplicate drainage sample No. KD 3011

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15 840 scale topographic machine plots.

GEOPEKO LIMITED 251187
KING ISLAND GROUP

SCALE: 1:10,000

No. KT9/74-4C

E.L. 9/74 012
BIRCH INLET, TASMANIA

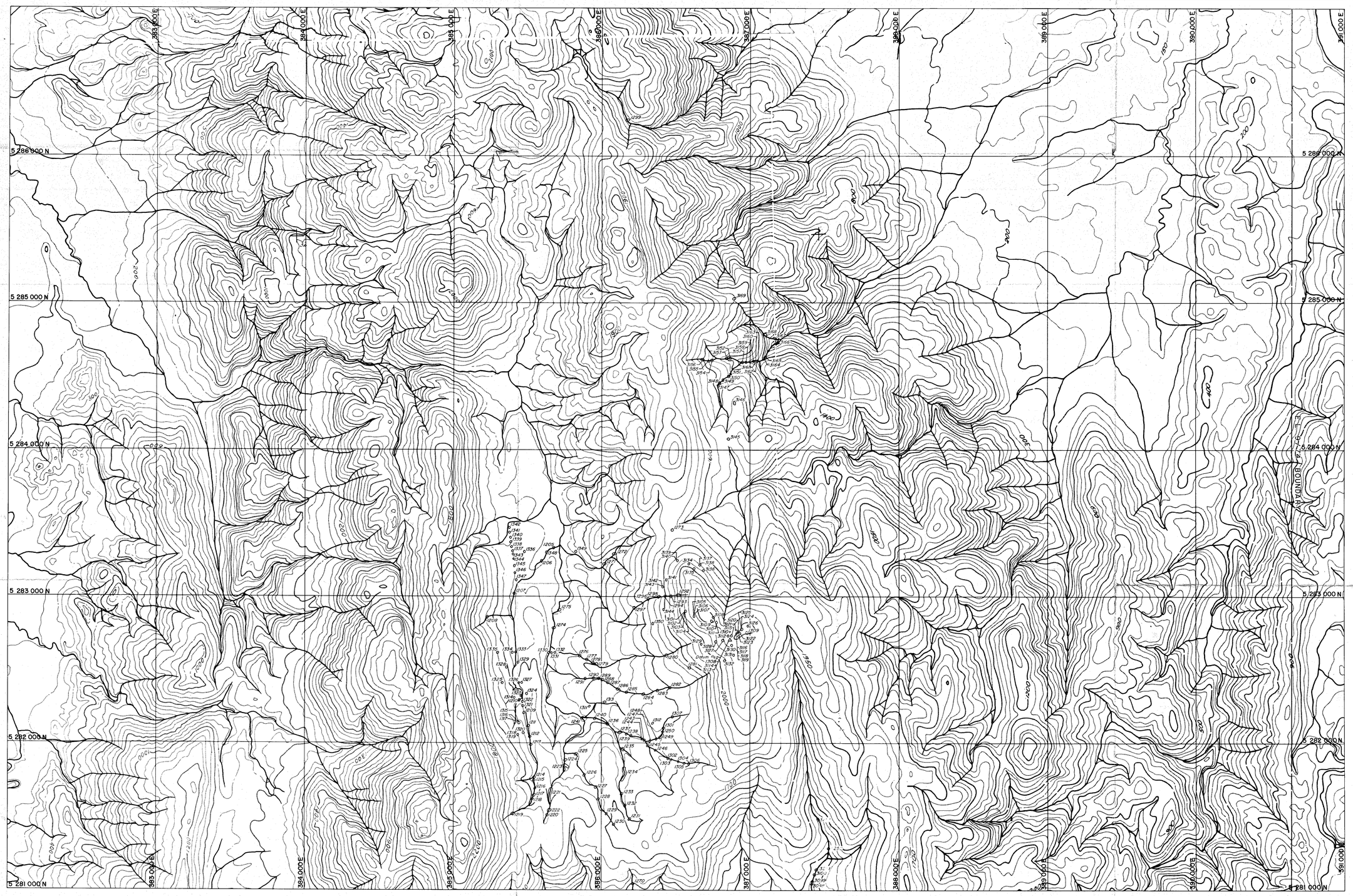
DRAWN: L.G.
CHECKED: M.C.R.
DATE: August 1977
GEOLOGIST: C.D.S. / G.L.B.

DRAINAGE SAMPLE LOCATION MAP

5 cm

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

76: 1275 Vol 2/2



LEGEND:

0 1246 Outcrop sample No. KR 1246

+1309 Float sample No. KR 1309

NOTE

This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15 840 scale topographic machine plots.

DATE: July 1977

GEOLOGIST: C. D. S. G. L. B.

DRAWN: L. G.

CHECKED: M. C. R.

GEOPEKO LIMITED

KING ISLAND GROUP

251188

SCALE: 1:10,000

No. KT9/74-1D

E.L. 9/74 013

BIRCH INLET, TASMANIA

ROCK SAMPLE LOCATION MAP

5 cm

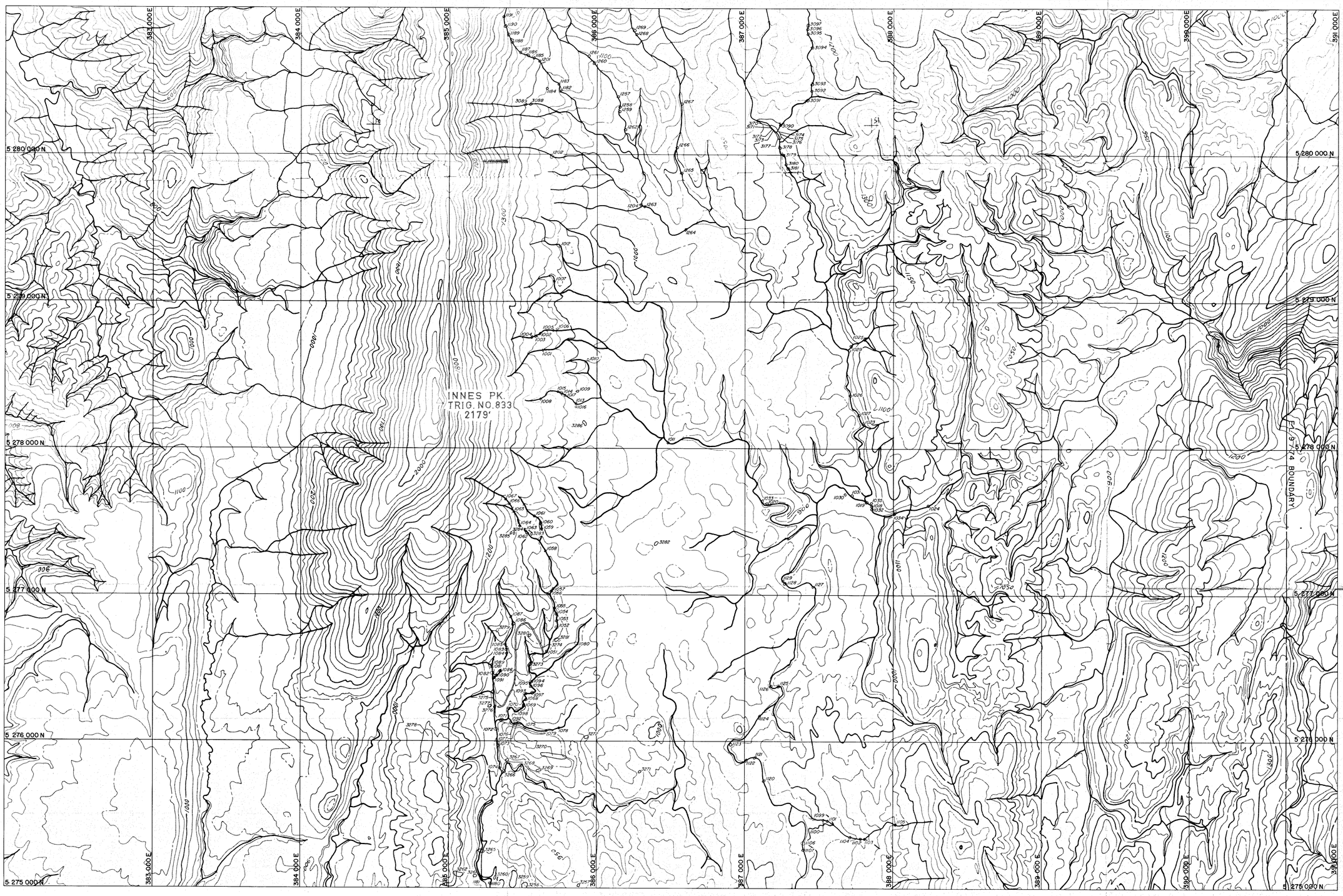
KT9/74-1

KT9/74-2

KT9/74-3

KT9/74-4

73-1275 Vol 2/3



LEGEND:
- ○ 3094 Outcrop sample No. KR 3094
- □ 1082 Float sample No. KR 1082

NOTE
This map has been compiled from enlargements of the Tasmanian Lands Department's 1 : 15840 scale topographic machine plots

GEOPEKO LIMITED
KING ISLAND GROUP
251189

SCALE: 1:10,000

No. KT9/74-2D

E.L. 9/74 014
BIRCH INLET, TASMANIA

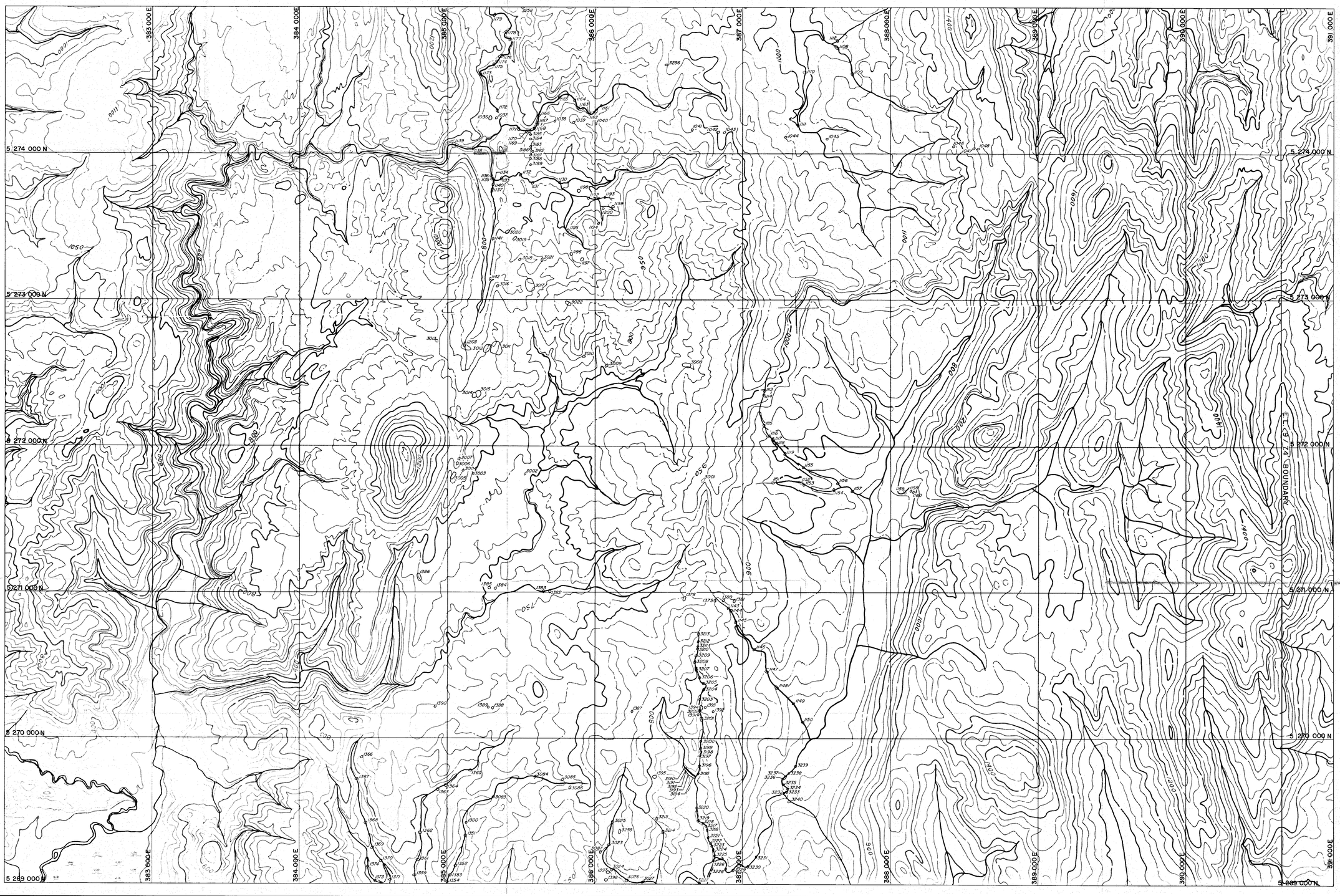
ROCK SAMPLE LOCATION MAP

5 cm

DATE: July 1977
GEOLOGIST: C.D.S. S.L.B.
DRAWN: L.G.J.
CHECKED: M.C.R.

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

75-1275 WI 212



LEGEND:
○ 1146 Outcrop sample No. KR 1146
□ 1139 Float sample No. KR 1139

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15 840 scale topographic machine plots.

GEOPEKO LIMITED
KING ISLAND GROUP
251190

SCALE: 1: 10,000

No. KT9/74-3D

E.L. 9/74 015

BIRCH INLET, TASMANIA

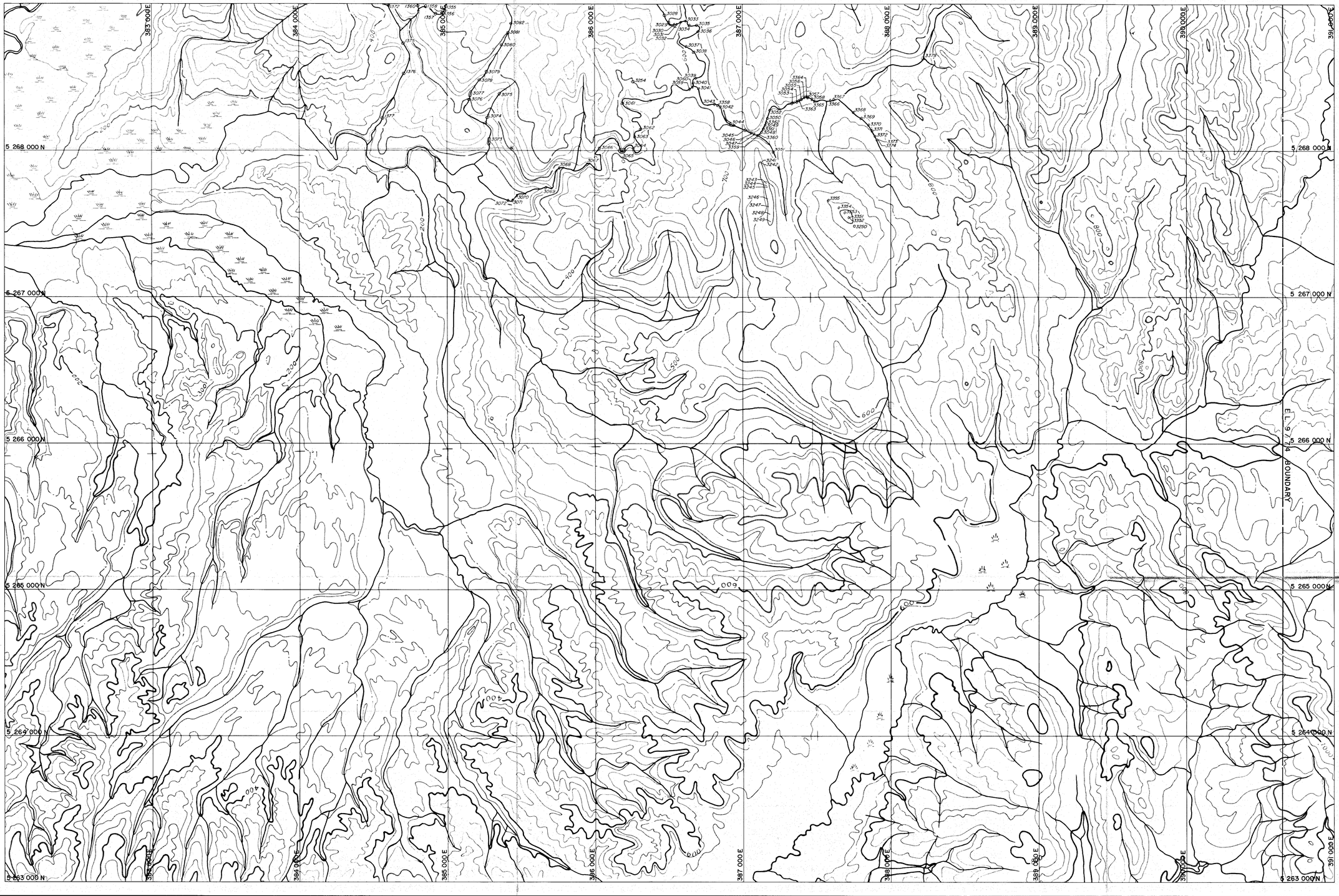
ROCK SAMPLE LOCATION MAP

5 cm

DATE: July 1977
GEOLOGIST C.D.S. G.L.B.
DRAWN: L.G.
CHECKED: M.C.R.

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

75-1275 Vol 2



LEGEND:

○ 3046 Outcrop sample No. KR 3046
○ 3378 Float sample No. KR 3378

NOTE:
This map has been compiled from enlargements of the Tasmanian Lands Department's 1:15840 scale topographic machine plots.

76-1275 Vol 2 | 3

GEOPEKO LIMITED
KING ISLAND GROUP
251191

SCALE: 1:10,000

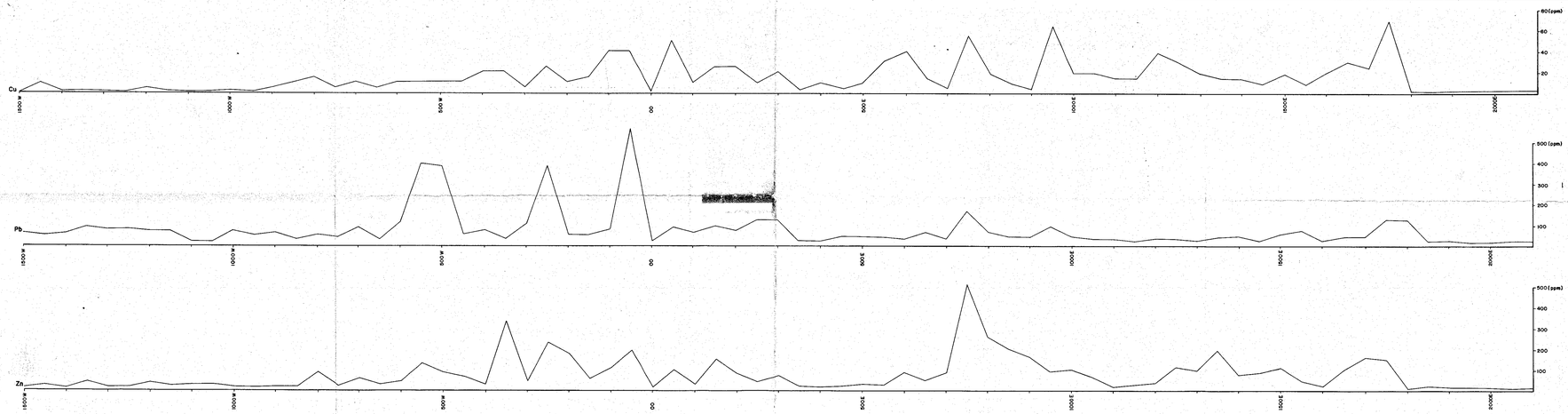
No. KT9/74-4D

E.L. 9/74 016
BIRCH INLET, TASMANIA
ROCK SAMPLE LOCATION MAP

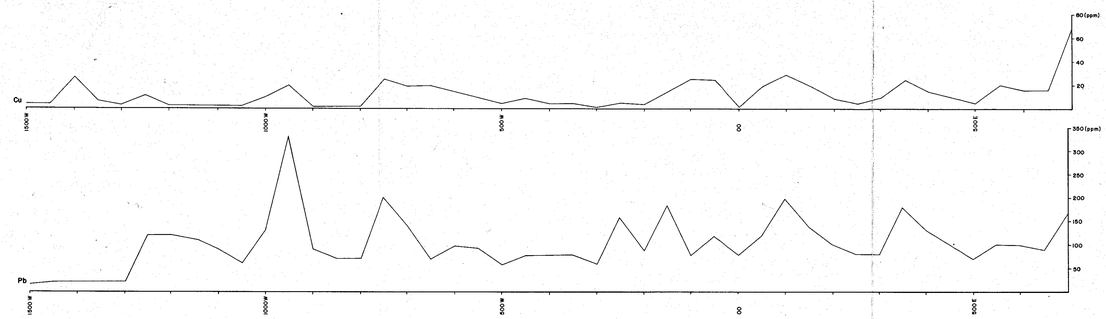
5 cm

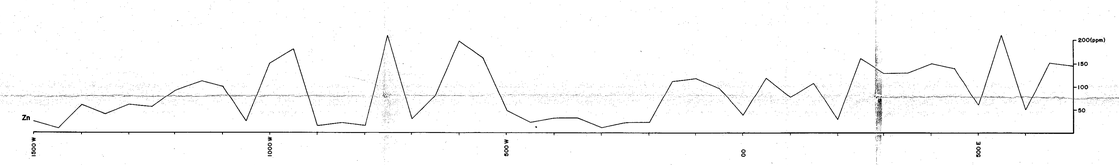
DATE: July 1977
GEOLOGIST: C.D.S. G.L.B.
DRAWN: L.G.
CHECKED: M.C.R.

KT9/74-1
KT9/74-2
KT9/74-3
KT9/74-4

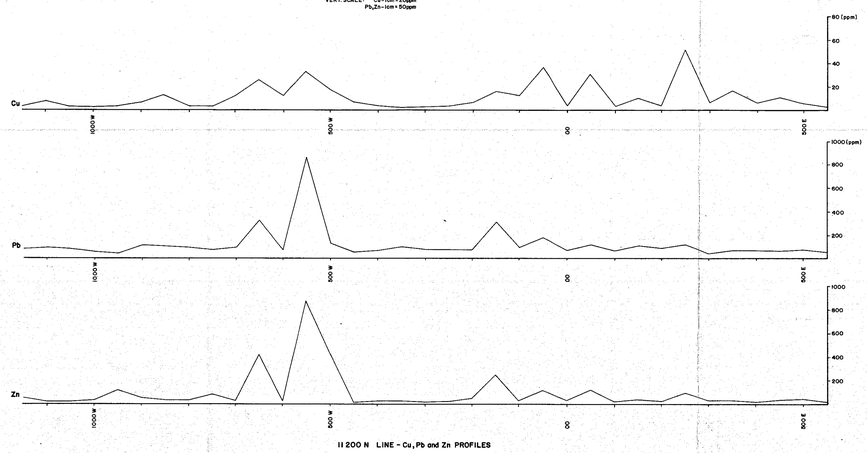


16000 N LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE: Cu-1cm = 20ppm
Pb, Zn-1cm = 100ppm

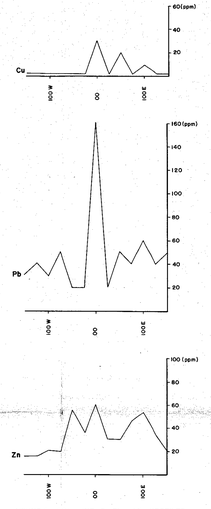




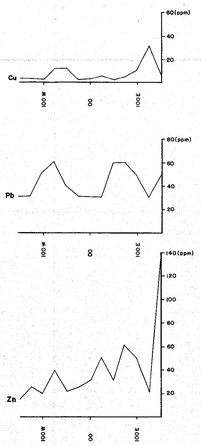
14 400 N LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE: Cu-1cm = 20ppm
Pb, Zn-1cm = 50ppm



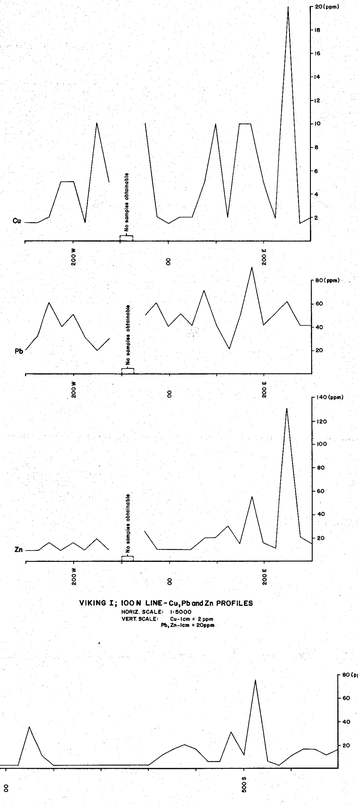
11 200 N LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE: Cu-1cm = 20ppm
Pb, Zn-1cm = 200ppm



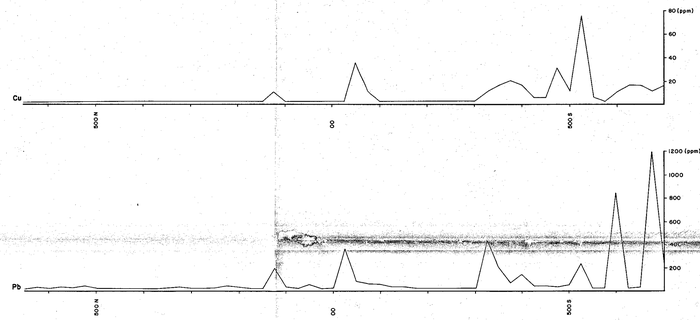
VIKING 5; 50N LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE Cu, Pb, Zn-1cm = 20ppm

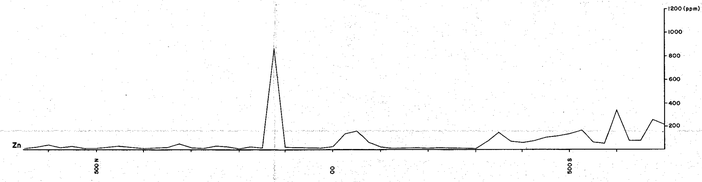


VIKING 5; 50S LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE: Cu, Pb, Zn-1cm = 20ppm



VIKING I; 100 N LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE: Cu-1cm = 2 ppm
Pb, Zn-1cm = 20ppm





VIKING 10; 00E LINE - Cu, Pb and Zn PROFILES
HORIZ. SCALE: 1:5000
VERT. SCALE: Cu-1cm = 20 ppm
Pb, Zn-1cm = 200ppm

7(-1275 (6)2)2

GEOPEKO LIMITED
KING ISLAND GROUP
251192

SCALE: As Noted

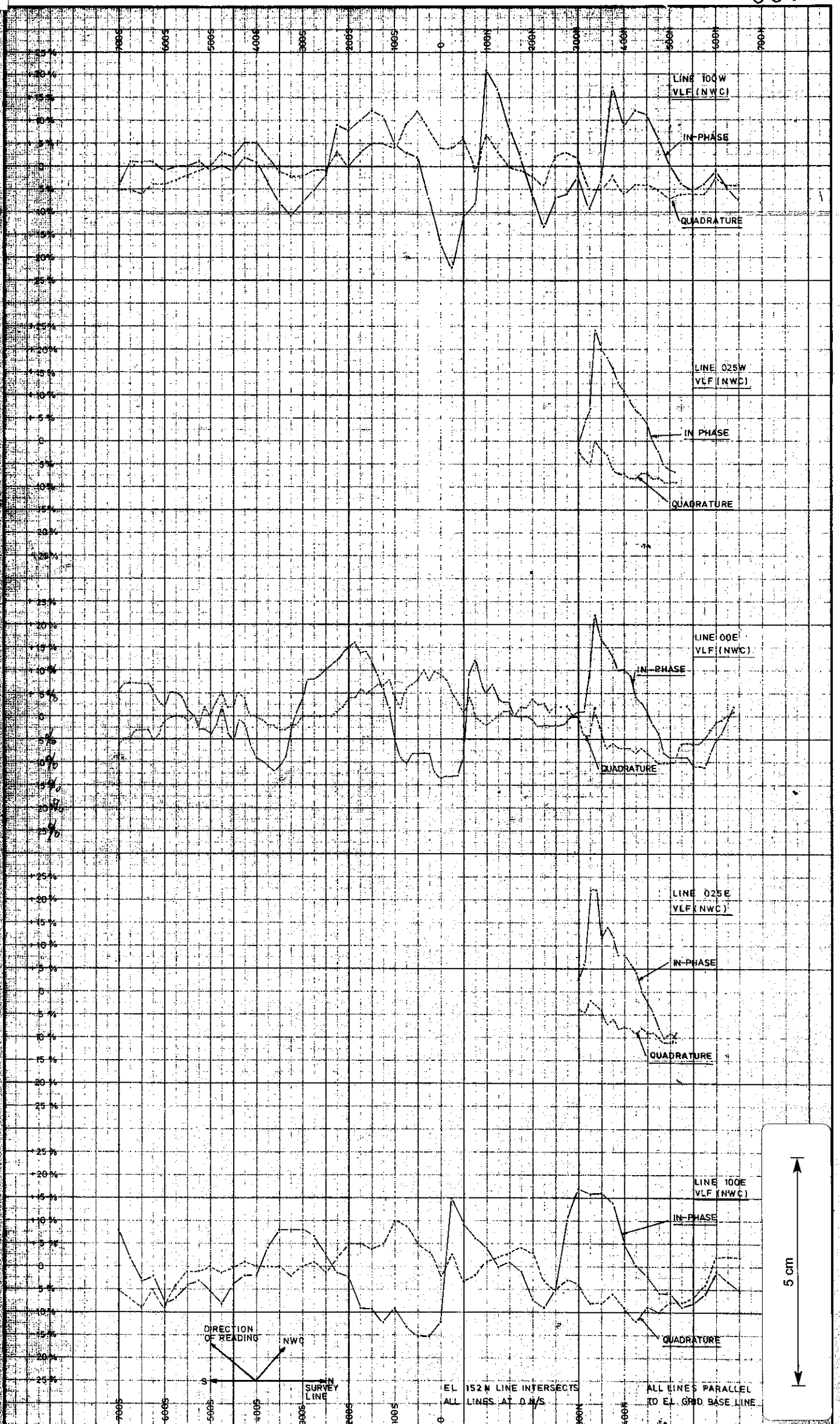
No. KT 9/74-1E

017

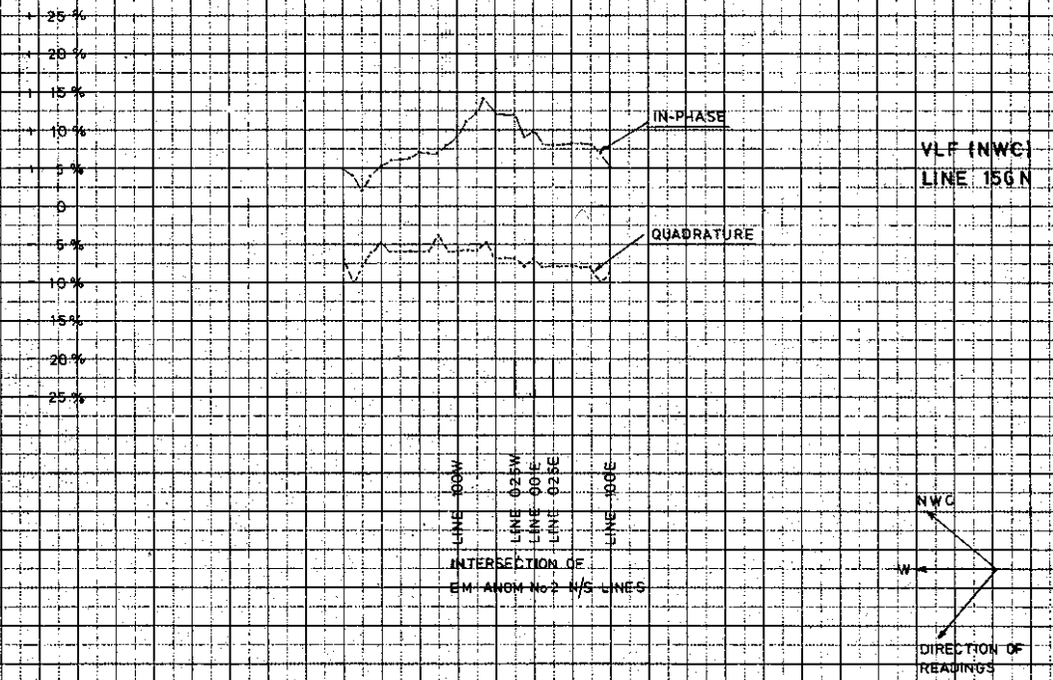
DATE: APRIL, 1978
GEOLOGIST: C.D.S.
DRAWN: R.F.
CHECKED: M.C.R.

E.L. 9/74 BIRCH INLET, TAS.
"C" HORIZON GEOCHEMICAL RESULTS
Cu, Pb and Zn PROFILES

5 cm

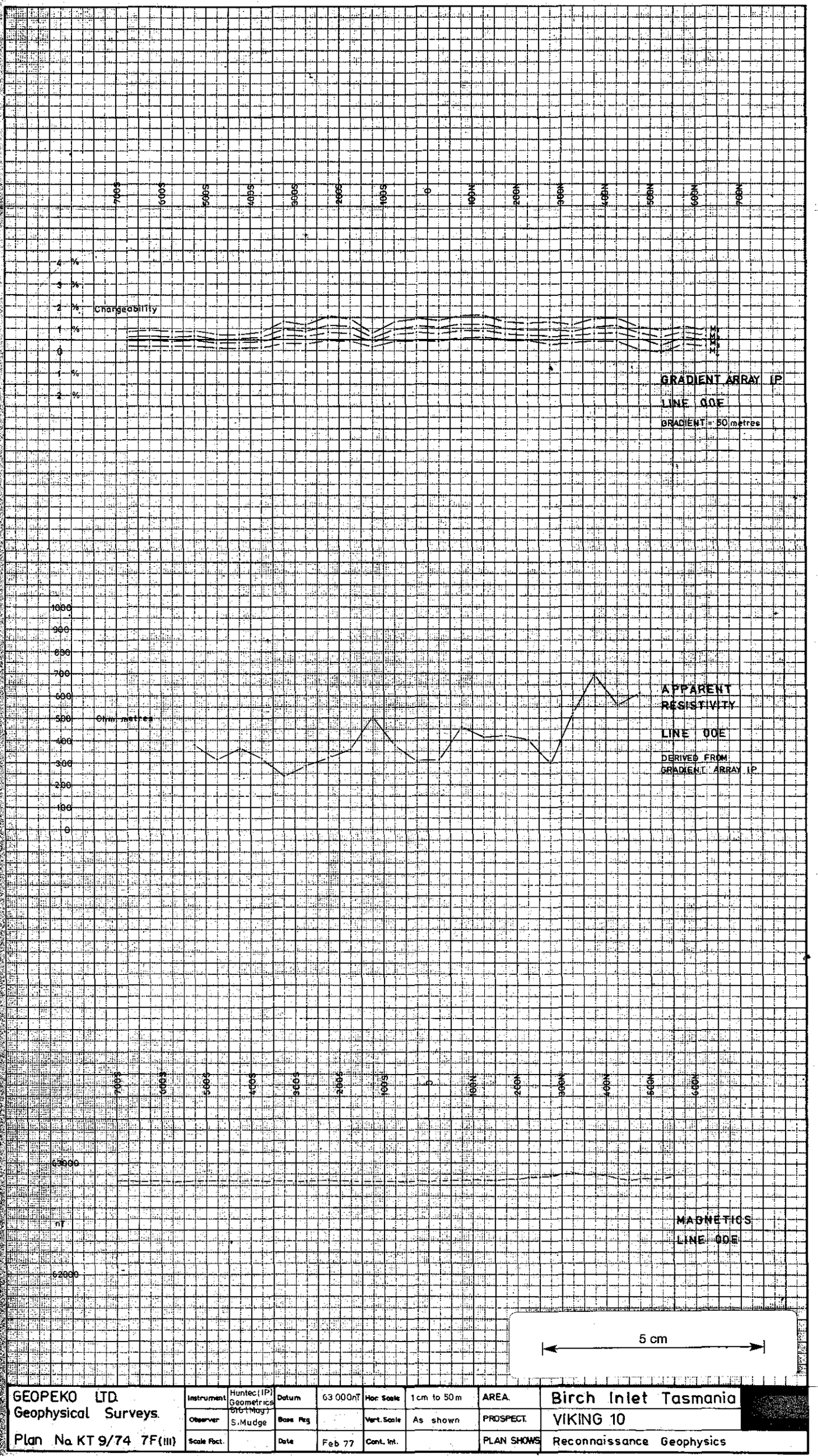


GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM 16	Datum	–	Hor. Scale	1cm to 50m	AREA	Birch Inlet Tasmania
	Observer	'S Mudge	Base Reg	–	Vert. Scale	1 cm to 5%	PROSPECT	VIKING 10
Plan No. KT9/74 7F(I)	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics



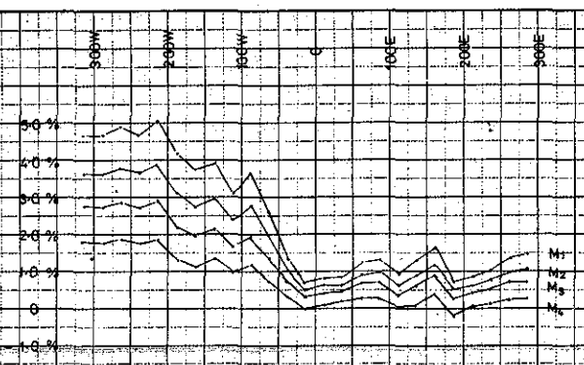
5 cm

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM 16	Datum	—	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	1 cm to 5%	PROSPECT.	VIKING 10
Plan No. KT 9/74 7F(11)	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics



GEOPEKO LTD. Geophysical Surveys.	Instrument	Huntec (IP) Geometrics G16 (Mag)	Datum	63 000nT	Hor. Scale	1 cm to 50 m	AREA	Birch Inlet Tasmania
	Observer	S. Mudge	Base Reg		Vert. Scale	As shown	PROSPECT	VIKING 10
Plan No. KT 9/74 7F(III)	Scale Fact.		Date	Feb 77	Cont. Int.		PLAN SHOWS	Reconnaissance Geophysics

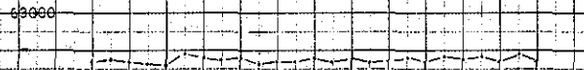
5 cm



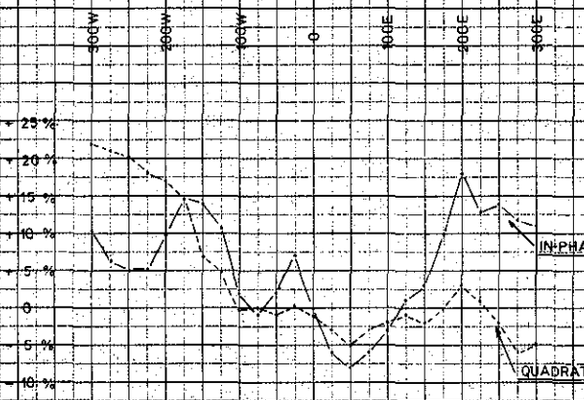
GRADIENT IP
Gradient = 25 metres
LINE 100N



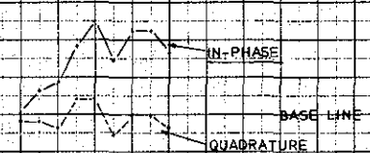
RESISTIVITY
LINE 100N



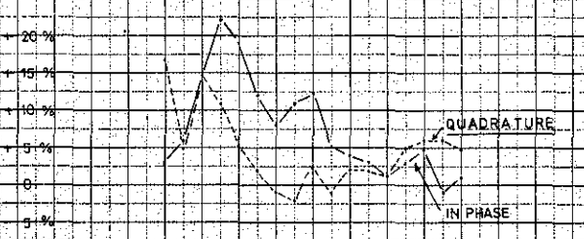
MAGNETICS
LINE 100N



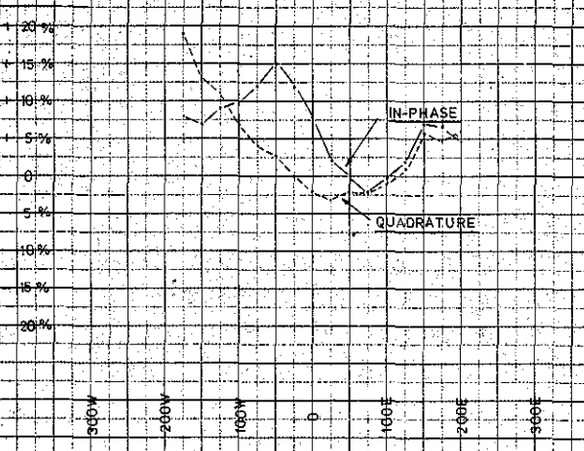
LINE 100N



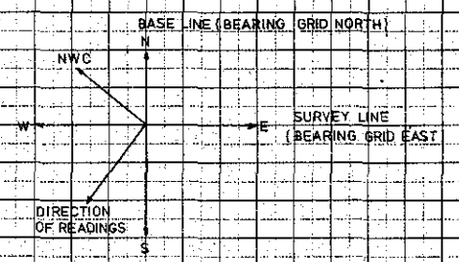
VLF (NWC)



LINE 00S

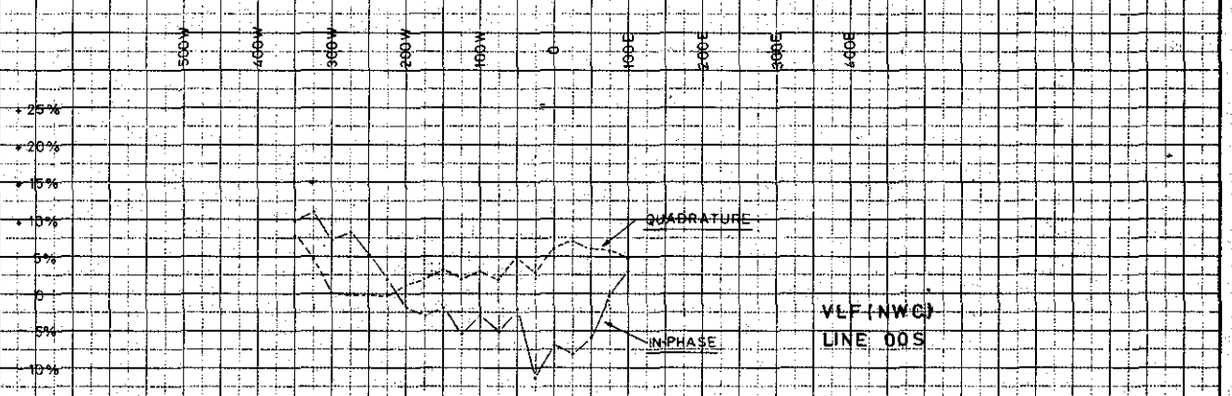


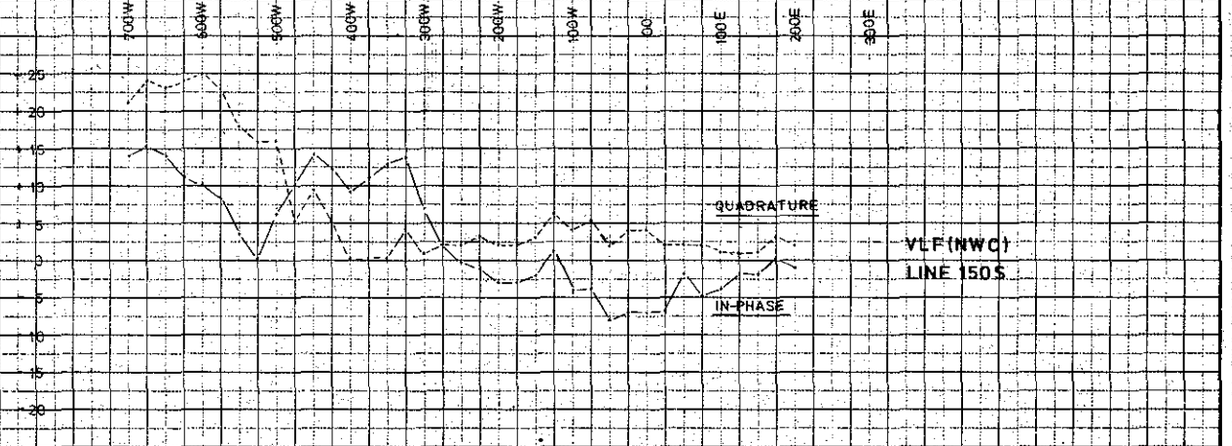
LINE 100S

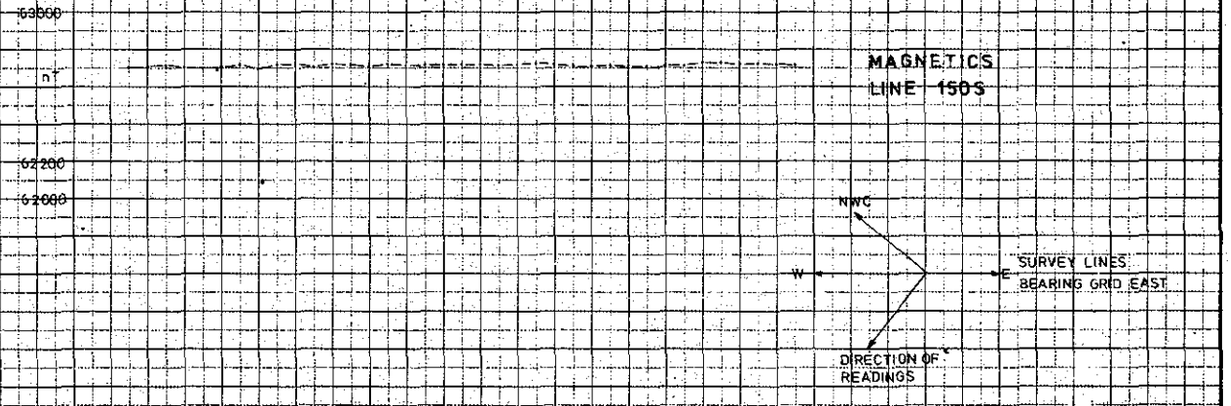


GEOPEKO LTD. Geophysical Surveys.	Instrument	Runtec I.P. Geometrics Unimag	Datum	63000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	Geonics EM16 S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	VIKING 1
Plan No. KT9/74-1F	Scale Fact.		Date	Feb 77	Cont. Int.		PLAN SHOWS	Reconnaissance Geophysics

5 cm







GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics Unimag	Datum	63000nT	Hor. Scale	1cm to 50m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	VIKING 2
Plan No. KT9/74 2F	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

5 cm

S 300 S | S 200 S | S 100 S | 0 | N 100 N | N 200 N | N 300 N

+25% +20% +15% +10% +5% 0 -5% -10% -15% -20% -25%

IN-PHASE

QUADRATURE

LINE 0·0E
VLF (NWC)

QUADRATURE

IN-PHASE

LINE 100E
VLF (NWC)

300 W | 200 W | 100 W | 0 | 100 E | 200 E | 300 E

IN-PHASE

QUADRATURE

LINE 0·0 N
VLF (NWC)

NORTH/SOUTH SURVEY LINES
(BEARING GRID NORTH/SOUTH)

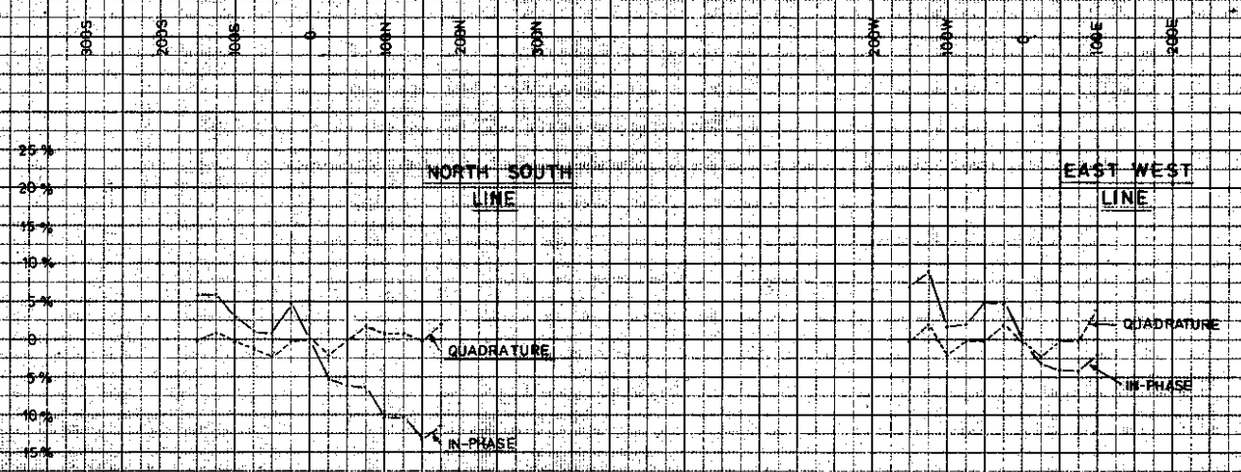
NWC

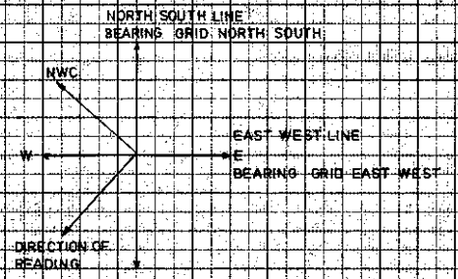
EAST/WEST SURVEY LINE
(BEARING GRID EAST/WEST)

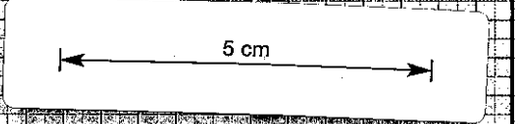
READING DIRECTION

GEOPEKO LTD. Geophysical Surveys	Instrument	Geonics EM16	Datum	—	Hor. Scale	1cm to 50m	AREA.	Birch Inlet Tasmania.
	Observer	S. Mudge	Base Reg	—	Vert. Scale	1cm to 5%	PROSPECT.	VIKING 3
Plan No. KT9/74 4F	Scale Fact.	—	Date	Feb. 1977	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics.

251198







GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM 16	Datum	-	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S Mudge	Base Peg	-	Vert. Scale	1 cm to 5%	PROSPECT.	VIKING 4
Plan No. KT9/74 5F	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

010

200W 100W 0 100E 200E 300E

+15% +10% +5% 0 -5% -10% -15%

QUADRATURE
IN-PHASE
LINE 151·5N

149N 150N 151N 152N

+15% +10% +5% 0 -5% -10%

QUADRATURE
IN-PHASE
VLF (NWC) BASE LINE

63000 nT 62000

QUADRATURE
IN-PHASE
LINE 150·5N

MAGNETICS BASE LINE

LINE BEARING GRID NORTH SOUTH

QUADRATURE
IN-PHASE
LINE 149·5N

BASE LINE
NWC
EAST/WEST SURVEY LINES
DIRECTION OF READING

IN-PHASE
QUADRATURE
LINE 148·5N

VLF (NWC)

200W 100W 0 100E 200E 300E

5 cm

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics 816	Datum	63000nT	Hor. Scale	1 cm to 50 m	AREA. Birch Inlet Tasmania
	Observer	S. Mudge	Base Reg.		Vert. Scale	as shown	PROSPECT. VIKING II
Plan No. KT 9/74 8F	Scale Fact.	—	Date	Feb 1977	Cont. Int.	—	PLAN SHOWS Reconnaissance Geophysics

251200

5 cm

200W 100W 0 100E 200E 300E 400E 500E 600E

15%
10%
5%
0
5%
10%
15%

QUADRATURE

IN-PHASE

LINE 100N
VLF (NWC)

63000

nT

LINE 100N
MAGNETICS

62000

NWC

SURVEY LINES
BEAR 90° (Mag)

DIRECTION OF
READINGS

+ 15%
+ 10%
+ 5%
0
- 5%
- 10%
- 15%
- 20%
- 25%

QUADRATURE

IN-PHASE

LINE 00N
VLF (NWC)

200W 100W 0 100E 200E 300E 400E 500E 600E

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics Unimag	Datum	63 000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S.Mudge	Base Reg	-	Vert. Scale	as shown	PROSPECT.	VIKING 14
Plan No. KT 9/74 10F	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

5 cm

0 100E 200E 300E 400E 500E 600E 700E

+55%
+45%
+35%
+25%
+15%
+10%
+5%
0
-5%
-10%
-15%
-20%
-25%
-30%
-35%
-40%

IN PHASE

VLF (NWC)

LINE FOLLOWS HALES RIVER

QUADRATURE

Water Falls

63000

nT

62000

NWC

W

APPROX DIRECTION OF HALES RIVER

READING DIRECTION

MAGNETICS

0 100E 200E 300E 400E 500E 600E 700E

GEOPEKO LTD. Geophysical Surveys	Instrument	Geonics EM16 Geometrics Unimag	Datum	63000nT	Hor. Scale	1 cm to 50 m	AREA	Birch Inlet Tasmania
	Observer	S Mudge	Base Reg.		Vert. Scale	as shown	PROSPECT	VIKING 15
Plan No. KT9/74 9F	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

251202

0 100E 200E 300E 400E 500E 600E 700E

+30% +25% +20% +15% +10% +5% 0 -5% -10% -15% -20%

IN-PHASE

QUADRATURE

VLF (NWC)

LINE BEARING 30°(Mag.)

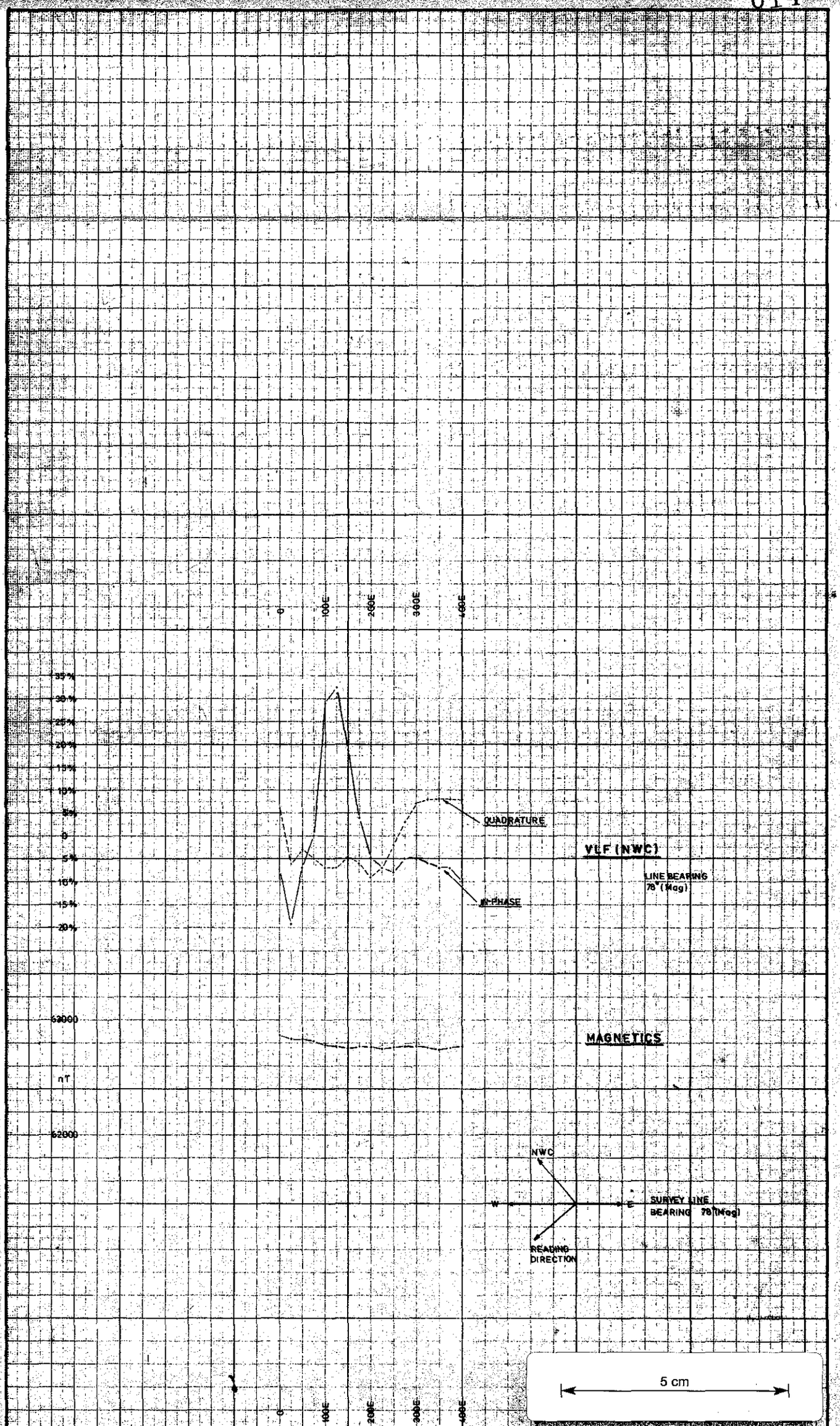
SURVEY LINE BEARING 90° Mag

NWC

DIRECTION OF READING

5 cm

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16	Datum	-	Hor. Scale	1 cm to 50 m	AREA	Birch Inlet Tasmania
	Observer	S. Mudge	Base Reg	-	Vert. Scale	1 cm to 5%	PROSPECT	VIKING 16
Plan No. KT 9/74 IIF	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics



GEOPEKO LTD. Geophysical Surveys	Instrument	Geonics EM16 Geometrics Unimag	Datum	63 000nT	Hor. Scale	1 cm to 50 m	AREA	Birch Inlet Tasmania
	Observer	S.Mudge	Base Reg		Vert. Scale	as shown	PROSPECT	VIKING 17
Plan No. KT9/74 12F	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

0 100E 200E

25%
20%
15
10
5
0
5
10
15
20

QUADRATURE

IN-PHASE

VLF (NWC)

LINE BEARING
90° (Mag).

63000

62000

MAGNETICS

N.W.C

W

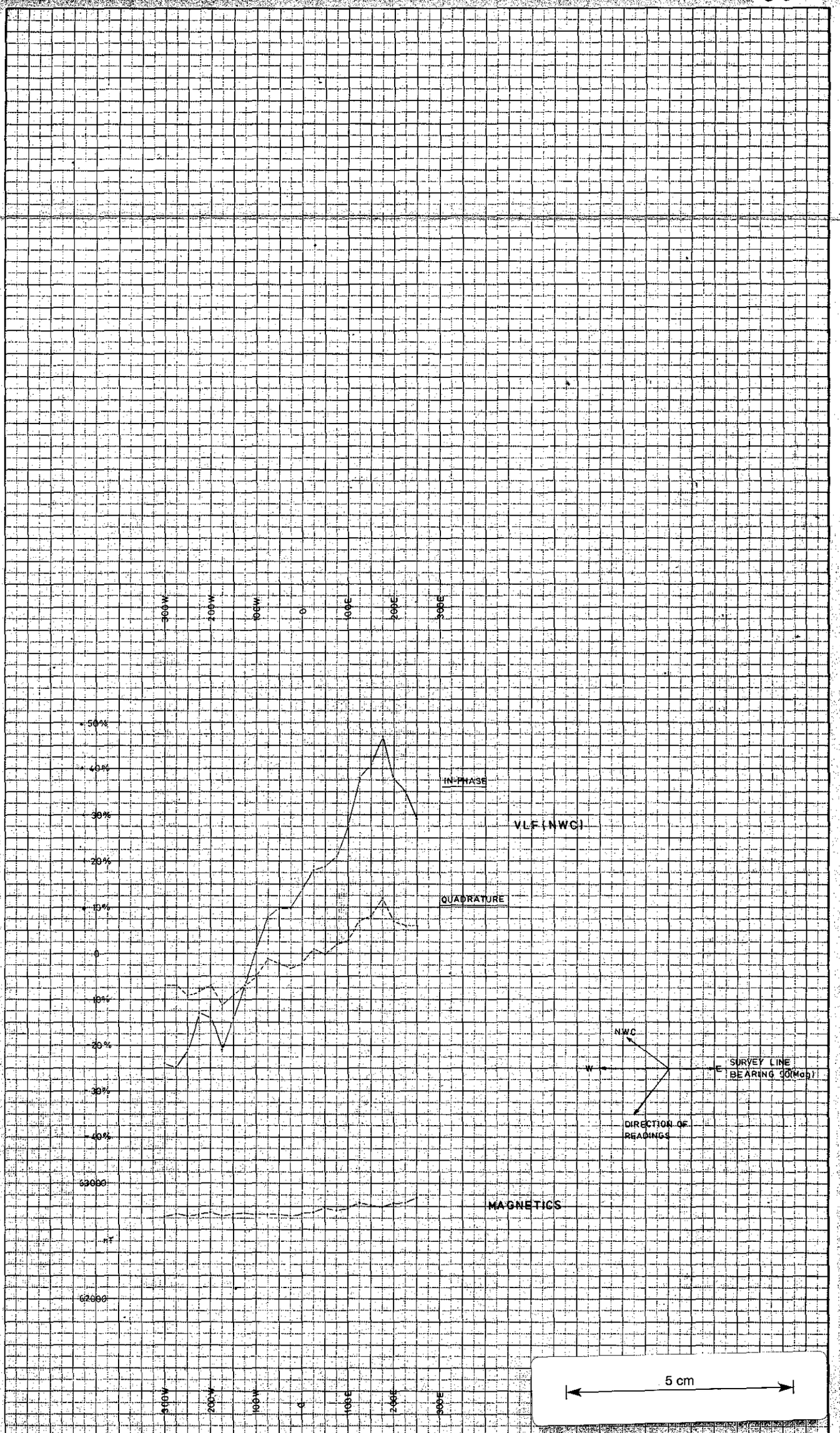
E

SURVEY LINE
BEARING 90° (Mag)

DIRECTION OF
READINGS

5 cm

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics Unimag	Datum	53 000n	Hor. Scale	1 cm to 50m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Reg		Vert. Scale	as shown	PROSPECT.	VIKING 18
Plan No. KT9/74 13F	Scale Fact	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics



GEOPEKO LTD. Geophysical Surveys. Plan No. KT9/74 3F	Instrument	Geonics EM16, Geometrics ~~Unimag~~	Datum	63000nT	Hor. Scale	1cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Reg.		Vert. Scale	as shown	PROSPECT.	VIKING 19
	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

251206

5 cm

200W 100W 0 100E 200E 300E

+25% +20% +15% +10% +5% 0 5% 10% 15% 20% 25%

IN-PHASE

QUADRATURE

VLF (NWC)
LINE 100N

IN-PHASE

QUADRATURE

VLF (NWC)
LINE 00S

200W 100W 0 100E 200E 300E

QUADRATURE

IN PHASE

VLF(NWC)
LINE 100S

200S 100S 0 100N 200N

IN-PHASE

QUADRATURE

VLF (NWC)
LINE 00E

LINE 00E
BEARING GRID NORTH/SOUTH

NWC

EAST/WEST
SURVEY LINES
BEARING GRID EAST WEST

DIRECTION
OF READING

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM 16	Datum	-	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	1 cm to 5%	PROSPECT.	VIKING 21
Plan No. KT9/74 6F	Scale Fact.	—	Date	Feb. 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

LINE 16N
VLF (NWC)

LINE 160N
VLF (NWC)
1700E to 2250E 25 metre data sampling

IN-PHASE
QUADRATURE

SURVEY LINES
NWC

MAGNETICS
nT

E-160N LINE
W
NWC
DIRECTION OF READINGS

5 cm

GEOPEKO LTD Geophysical Surveys. Plan No. KT9/74 14F	Instrument	Geonics EM 16	Datum		Hor Scale	1 cm to 50m	AREA	Birch Inlet Tasmania
	Observer	S. Mudge	Base Reg		Vert. Scale	1 cm to 5%	PROSPECT	U.O.D.C. TRAVERSE 16000N
	Scale Fact.		Date	February 1977	Cont Int		PLAN SHOWS	Reconnaissance Geophysics