AE 63 & 89.

COMMERCIAL: IN CONFIDENCE (39) & (48)

OYKELL MINERALS LTD (ACMIN EXPL N.L.) - PROJECT RRI/IIIA

ROSEHALL - SOUTH KYLE

723/20

SUMMARY

The aim of this project was to define the mineral potential of the Rosehall - South Kyle area. A preliminary assessment of the total mineral field in relation to the outcropping Late Caledonian granites was made.

Outcrop throughout the Rosehall area is generally very poor; a thin peat cover overlies much of the country rock. The area is underlain by southerly dipping Moine psammites with thin bands of pelitic schist and hornblende schist. Northeast trending faults occur near Rosehall and around the Grudie granite but a major northwest trending lineament with associated crush zones occurs along Glen Cassley. The Grudie granite, a Late Caledonian steep-sided adamellite boss intrudes the Moine rocks at Meall a' Gruididh. Minor mineralisation (galena + baryte) has been noted in Grudie Burn on the southeast side of the adamellite (Gallagher, 1970).

In late 1971 Oykell Minerals applied for assistance to the Department of Trade and Industry under the MEIGA scheme to carry out a geological, geochemical and geophysical reconnaissance over the Rosehall area. Robertson Research Int Ltd were commissioned to do the work. Subsequently in early 1972. The South Kyle area was added and a similar application to the Department of Trade and Industry approved.

Several new mineral occurrences (see map for Pb and Ba occurrences) have been found in the course of the work. They are generally located in NE trending fracture zones in which there is evidence of hydrothermal alteration. At the most extensive occurrence, 0.64 km NE of Rosehall, galena and baryte occur in a series of north trending fractures for about 100 m in a NNE trending fracture zone. Analysis of drift samples adjacent to this locality revealed anomalous Pb values with locally high Cr and Cu. Minor molybdenite was noted near the Grudie granite and fluorite, pyrite and calcite veins in other localities.

Stream sediment and minor rock chip and auger sampling were carried out over most of the area suitable for collection. Analysis of the results (using AAS and Emission Spectrography) gave the following threshold values-:

Pb	Cu	Zn	Mo	Sn	Ni
60 ppm	35 ppm	170 ppm	3 ppm	5 ppm	70 ppm
Co	**Cr**	**Ag**	**V**	**Ba**	**Ti**
30 ppm	150 ppm	1 ppm	150 ppm	0.15%	1.3%

W and Bi were consistently below detection limits. Anomalous values for

Pb and Ba agreed well with the observed mineral localities. Significant Pb, Zn and Cu anomalies were found in several parts of the Rosehall area. Mo anomalies occur close to the Grudie granite and Ba anomalies were noted at a greater distance.

Geophysical work consisted of a reconnaissance ratemeter and magnetometer survey, and detailed, very low frequency (VLF) and horizontal loop electromagnetic, and total magnetic intensity surveys over restricted zones where mineralisation was thought likely. The reconnaissance revealed no radio-active areas and variations in magnetic readings were not significant. Southwest of Meall a' Gruididh (see map) possible disseminated mineralisation with a vertical orientation is indicated at a depth of 38 m on both grid lines. No conclusive results were obtained from the other two grids.

Robertson Research Int Co recommend further detailed geophysical work on the area west of the Grudie granite particularly using VLF and magnetic methods. Detailed I.P. surveys would also be useful in defining the depth, orientation, grade and extent of mineralisation. If these methods prove successful they should be applied to areas with anomalous stream sampling results.

J R Mendum
Institute of Geological Sciences
19 Grange Terrace
Edinburgh
EH9 2LF

13 January 1975

FINANCIAL ASSISTANCE FOR MINERAL EXPLORATION (M.E.I.G.A.)

COMPANY: OYKEL MINERALS LTD

PROJECT: ROSEHALL

REF: AE 63
MRD 84/18
MRD 144/18

The following Open File material is held by B.G.S. in London, Keyworth and Edinburgh. Available for public inspection from 4.10.78.

- Section 4 of initial application submitted 2.11.71 with 3 statements of geology by Robertson Research Ltd

- * Report 758, Robertson Research "Geophysical survey of an area west of the Ghrudie Granite", by D.J. Patrick. July '72. With 4 enclosures:

  1 North westerly VLF-EM profiles

  2 South westerly VLF-EM profiles

  3 Magnetic contour map 1 : 5,000

  4 Rosehall Geophysical Survey: Geophysical Anomaly Zones 1 : 10,000

  (These enclosures are extremely poor copies)

  Report 735, Robertson Research, May 1972

  ° 18 pages and 23 pages of analyses

  ° Geochemical survey key

  ° Fig 1 Boundaries of survey area

  ° Fig 2 Geology and Geophysical Traverse lines

  ° Fig 5 Summary of Major Geochem. Anomaly Groupings Cu, Pb, Zn

  ° Fig 6 Geophysical Profiles along Traverse 1

  ° Fig 7 " " " " 2

  ° Fig 8 " " at Locality A

  ° Fig 9 " " at Localities B & C

  ° * Fig 10 Aeromagnetic map of the Grudie area

  ° Enclosures 1 to 10 Geochemical sampling plans 1 : 10,560, NC41SW, NC41SE, NC40NW, NC40NE, NC50NW, NC40SE, NC50SW, NH49NE, NH59NW, NH59NE

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* Not at Keyworth

AE 63

ROSEHALL.

ROBERTSON RESEARCH COMPANY LIMITED

QUOTATION NO. 649/278

CLIENT: OYKELL MINERALS LIMITED
Dowgate Hill House,
London EC4R 2SY.

PROJECT: MINERAL SURVEY OF AN AREA BETWEEN STRATH SHIN AND STRATH OYKELL, SUTHERLANDSHIRE

ROSEHALL?

SCOPE: The project will comprise a two stage mineral survey of an area lying between Strath Shin and Strath Oykell and owned by Mr. Graesser. The area is designated 3 on the accompanying map and occupies an estimated 5,050 acres.

The first stage would be of a reconnaissance nature and be aimed at defining areas on which detailed mineral exploration could justifiably be undertaken. It would involve the following work:

a. a field geological appraisal of the concession area;

b. a geochemical stream sediment survey undertaken on a suitable sample interval. Stream sediment samples would be analysed for appropriate elements; these would probably include copper, lead, zinc, molybdenum, manganese and fluorite as appropriate. The analytical results obtained would be interpreted to indicate areas of anomalously high values;

c. reconnaissance geophysical work would be done at the same time as the stream sediment sampling, and magnetometer and scintillometer readings would be made. This geophysical work would be extended into areas between streams where surface examination of rock was hampered by soil or peat cover;

d. chip samples of rock would be taken in selected areas for analysis to help locate areas of mineralisation;

e. shallow drilling of a preliminary nature might be undertaken in areas of soil cover during the first stage, if the results of the geochemical or geophysical work suggested this to be desirable.

f. the results of the survey would be incorporated in a report which would also give recommendations for the work to be carried out in Stage II of the Project.

The second stage of the project would involve detailed geological, geochemical and geophysical techniques. These techniques would be supplemented as appropriate by shallow drilling on a grid pattern to obtain data in areas of soil or peat cover. In addition, deeper drilling would be carried out on any ore bodies discovered, the programme being aimed at the assessment of ore reserves and grade and the determination of the viability of any particular ore deposit.

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DIRECTORS: DR W. F. ROBERTSON J. C. ROBERTSON, D.I. DR. R. H. CUMMINGS DR. W. W. BROWN

GEOLOGICAL SUMMARY OF THE AREA FOR OYKELL MINERAL'S GRANT APPLICATION

Forestry Land North of Strath Oykell (Area 2)

The area occupies some 7,850 acres and is predominantly underlain by rocks forming part of the Moine metamorphic series. Main rock types present are flaggy quartz granulites, and metamorphosed pelitic rocks such as muscovite and biotite schists with occasional hornblende schists. Quartz veining and brecciation along faults also occur within the area. Much of the area is covered by peat and/or glacial drift.

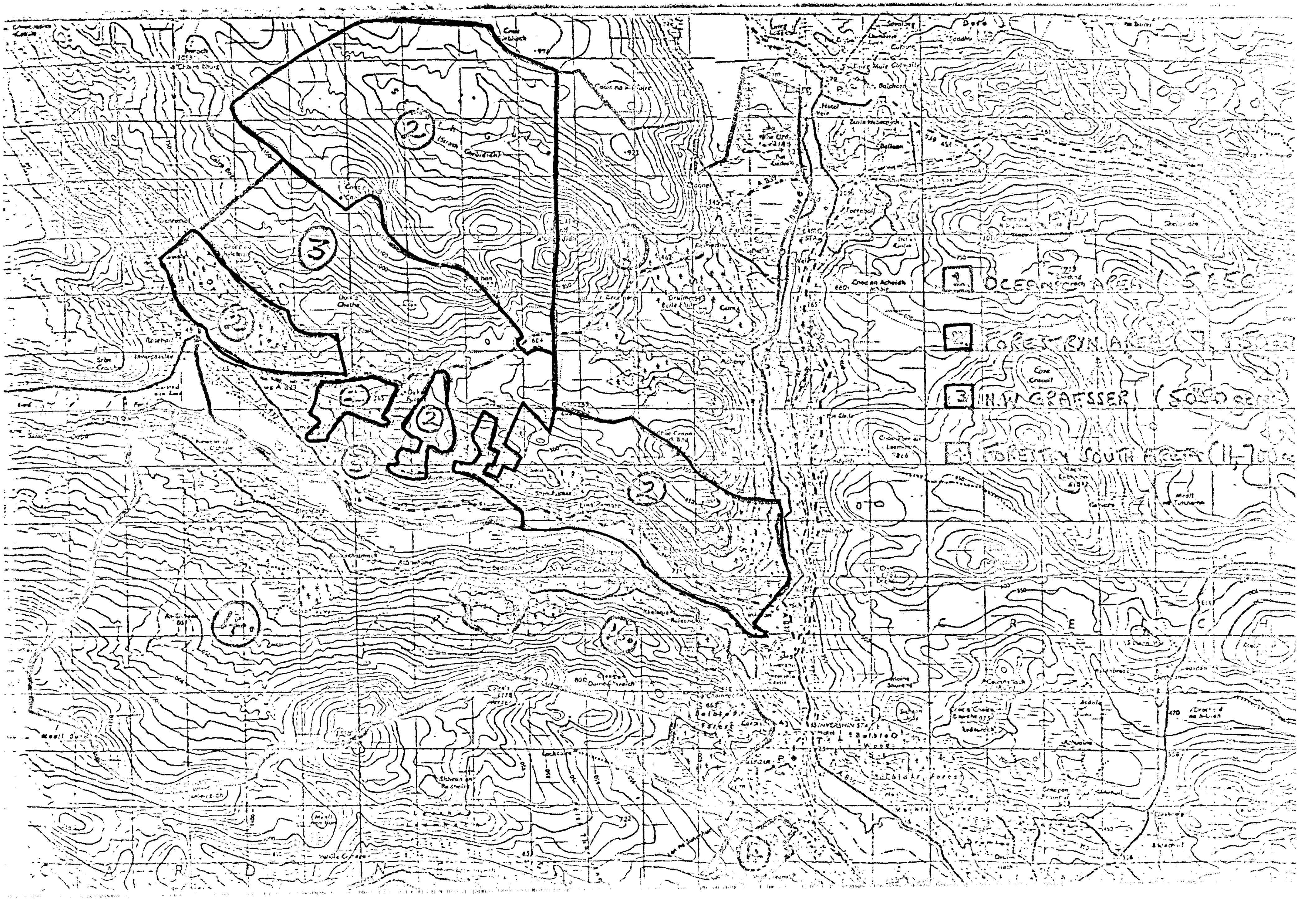
The regional strike is east northeast-west southwest with dips predominantly to the south or south southeast ranging from 35° to vertical in places. Two major fold patterns are recognisable in the region, one striking NNE-SSW and a second fold system is developed at right angles.

Old Parish records record the former working of iron and manganese in the Rosehall area.

The area involved is illustrated on the accompanying map.

REDUCED SCALE

ROSEHALL



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ROBERTSON RESEARCH COMPANY LIMITED

GEOLOGICAL SUMMARY OF THE A
OYKELL MINERAL'S GRANT APPL...

Forestry Land South of Strath Oykell (Area 4)

An area occupyi... ... ..,... acres south of the Oykell River a... the west of Invershin is underlain predominantly by Moinian sil... granulites. The regional strike is ENE-SSW and the dip predominantly to the south. A large portion of the area is covered by peat and/or glacial drift.

Lamprophyre dykes cut the granulites as do small dykes of hybrid composition (granite/scyelitic). Small outcrops of hornblende schist, epidiorite and amphibolite occur whilst a larger area of pelitic schist occurs in the extreme west of the region. Veins of granitic material are infrequently recorded.

The area involved is illustrated on the accompanying map.

ROBERTSON RESEARCH COMPANY LIMITED

QUOTATION NO. 649/313

CLIENT:

OYKEL MINERALS LIMITED
c/o Acmin Explorations No Liability,
Level 20, Norwich House,
6-10 O'Connel Street,
Sydney, New South Wales 2000,
Australia.

PROJECT:

FURTHER GEOLOGICAL AND GEOCHEMICAL INVESTIGATIONS AT ROSEHALL

SCOPE:

Preliminary results on mineral exploration in areas 2 and 3 at Rosehall (as contained in our Quotations 649/278 and 649/279) and published information on the possible mineralisation of adjacent areas, have shown that additional work is necessary to delimit the extent of the mineralisation in the Rosehall area. It is proposed that this work should be completed as part of Phase I of the Rosehall Survey. It would involve :

a. determining the northerly and easterly extensions of the Glen Cassley anomalies

b. determining the westerly and northerly extensions of the geochemical anomalies west of Glen Cassley

c. tracing the extent of geochemical anomalies into area 4, south of the Oykell river.

The work would be undertaken by stream sediment geochemistry, possibly with some soil and rock chip sampling. All samples collected would be analysed by atomic absorbtion methods for copper, lead and zinc. Geological prospecting would also be undertaken.

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GEOLOGICAL SUMMARY OF THE AREA FOR OYKELL MINERAL'S GRANT APPLICATION

Mr. Graesser's Land (Area 3)

The area occupies some 5,050 acres and is predominantly underlain by rocks forming part of the Moine metamorphic series. Main rock types present are flaggy quartz granulites, and metamorphosed pelitic rocks such as muscovite and biotite schists with occasional hornblende schists. Quartz veining and brecciation along faults also occur within the area. Much of the area is covered by peat and/or glacial drift.

The regional strike is east northeast-west southwest with dips predominantly to the south or south southeast ranging from 35° to vertical in places. Two major fold patterns are recognisable in the region, one striking NNE-SSW and a second fold system is developed at right angles.

Old Parish records record the fomer working of iron and manganese in the Rosehall area.

The area involved is illustrated on the accompanying map.

3. The second stage of the project would involve detailed geological, geochemical and geophysical techniques. These techniques would be supplemented as appropriate by shallow drilling on a grid pattern to obtain data in areas of soil or peat cover. In addition, deeper drilling would be carried out on any ore bodies discovered, the programme being aimed at the assessment of ore reserves and grade and the determination of the viability of any particular ore deposit.

ROBERTSON RESEARCH COMPANY LIMITED

QUOTATION NO. 649/279

CLIENT: OYKELL MINERALS LIMITED
Dowgate Hill House,
London EC4R 2SY.

PROJECT: MINERAL SURVEY OF AN AREA BETWEEN STRATH SHIN AND STRATH OYKELL, SUTHERLANDSHIRE

SCOPE:

1. The project will comprise a two stage mineral survey of an area lying between Strath Shin and Strath Oykell and owned by the Forestry Commission. It is designated 2 on the accompanying map and occupies an estimated 7850 acres.

2. The first stage would be of a reconnaissance nature and be aimed at defining areas on which detailed mineral exploration could justifiably be undertaken. It would involve the following work:

   a. a field geological appraisal of the concession area;

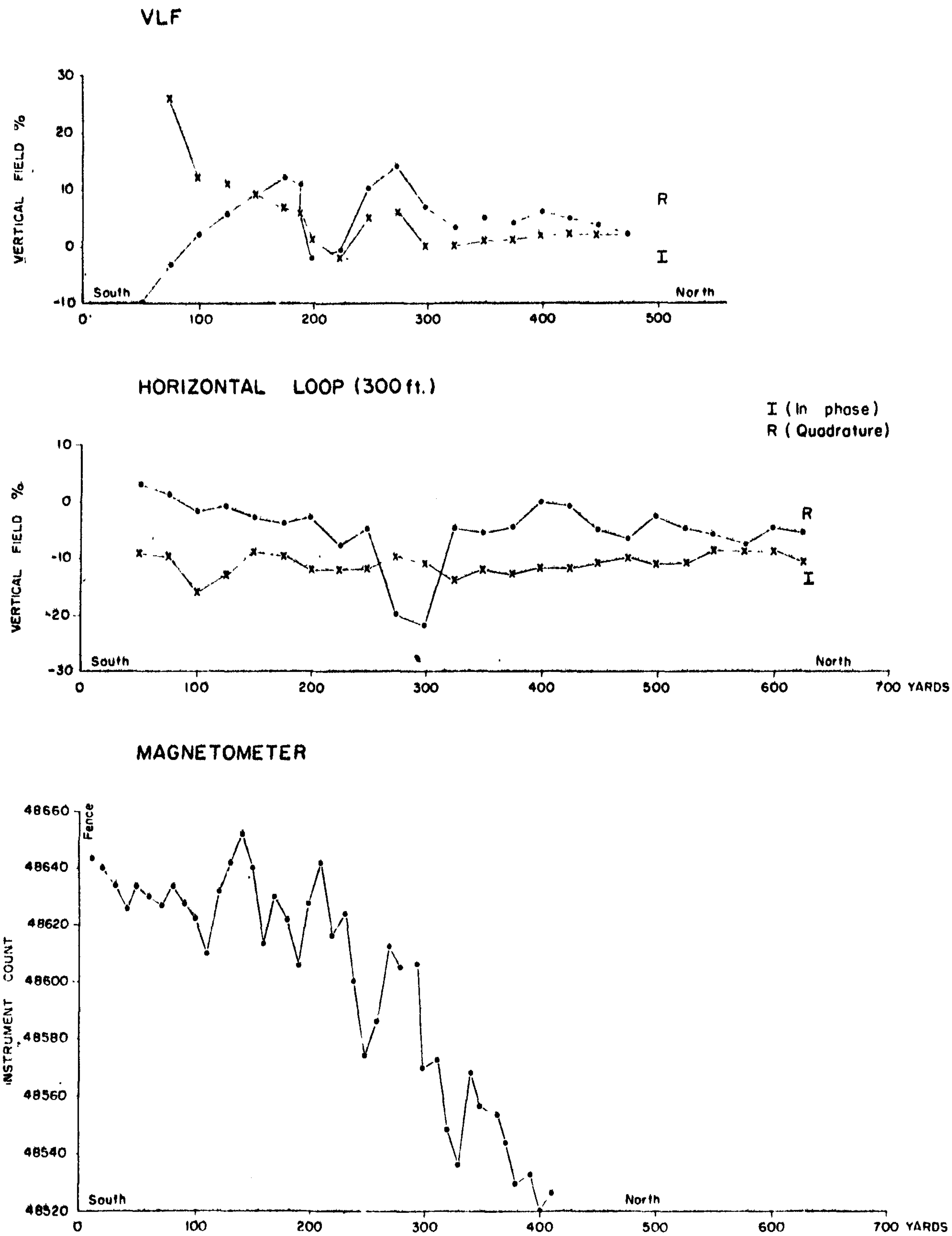
   b. a geochemical stream sediment survey undertaken on a suitable sample interval. Stream sediment samples would be analysed for appropriate elements; these would probably include copper, lead, zinc, molybdenum, manganese and fluorite as appropriate. The analytical results obtained would be interpreted to indicate areas of anomalously high values;

   c. reconnaissance geophysical work would be done at the same time as the stream sediment sampling, and magnetometer and scintillometer readings would be made. This geophysical work would be extended into areas between streams where surface examination of rock was hampered by soil or peat cover;

   d. chip samples of rock would be taken in selected areas for analysis to help locate areas of mineralisation;

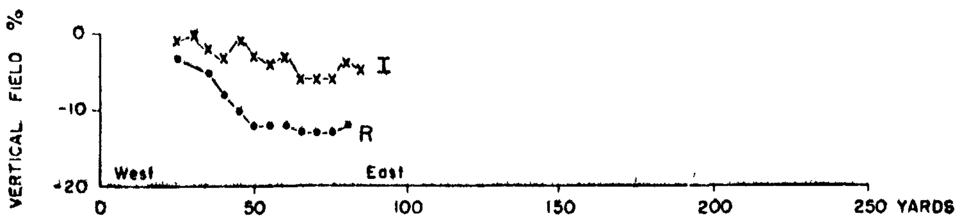
   e. shallow drilling of a preliminary nature might be undertaken in areas of soil cover during the first stage, if the results of the geochemical or geophysical work suggested this to be desirable.

   f. the results of the survey would be incorporated in a report which would also give recommendations for the work to be carried out in Stage II of the Project.

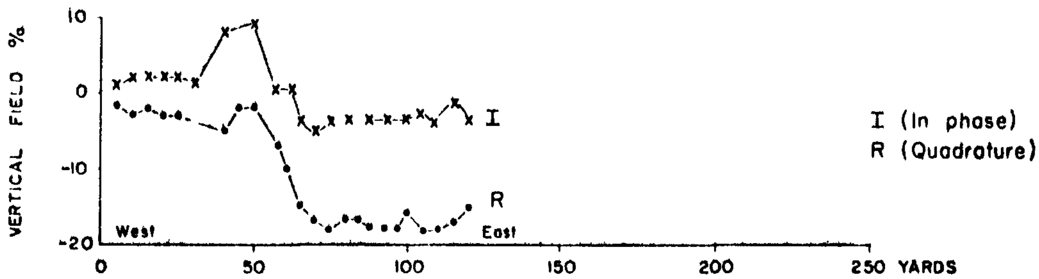


GEOPHYSICAL PROFILES ALONG TRAVERSE 2

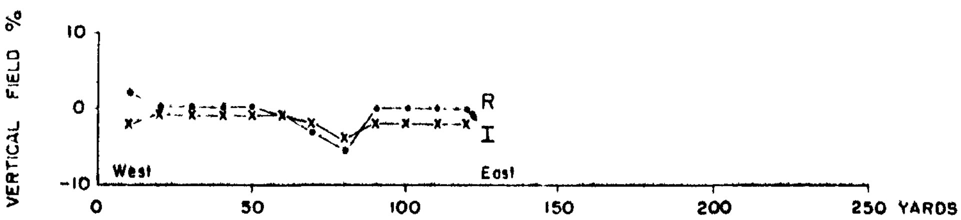
FIGURE 7



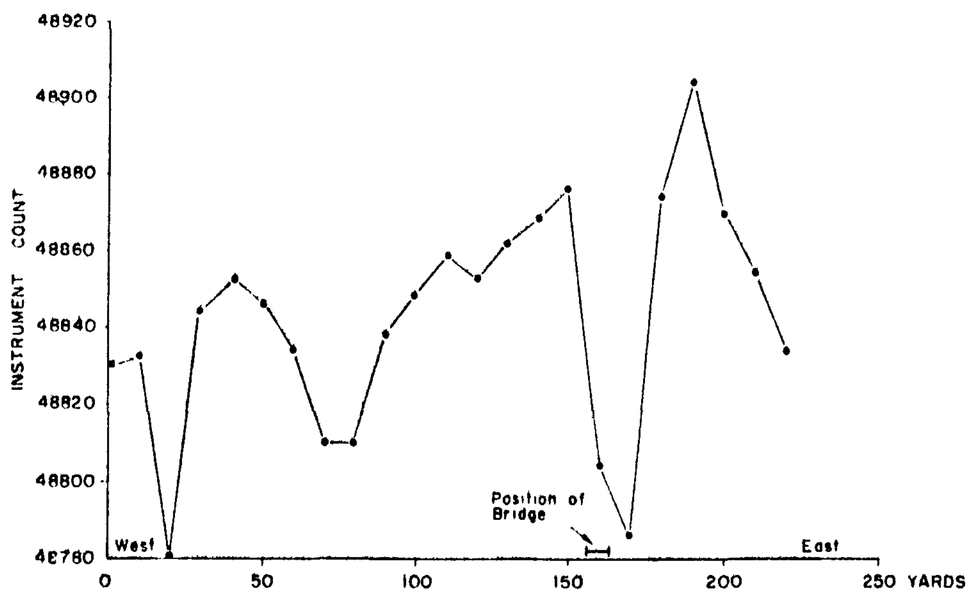
VLF:- LOCALITY A (ii)



HORIZONTAL LOOP (300 ft.):- LOCALITY A (ii)

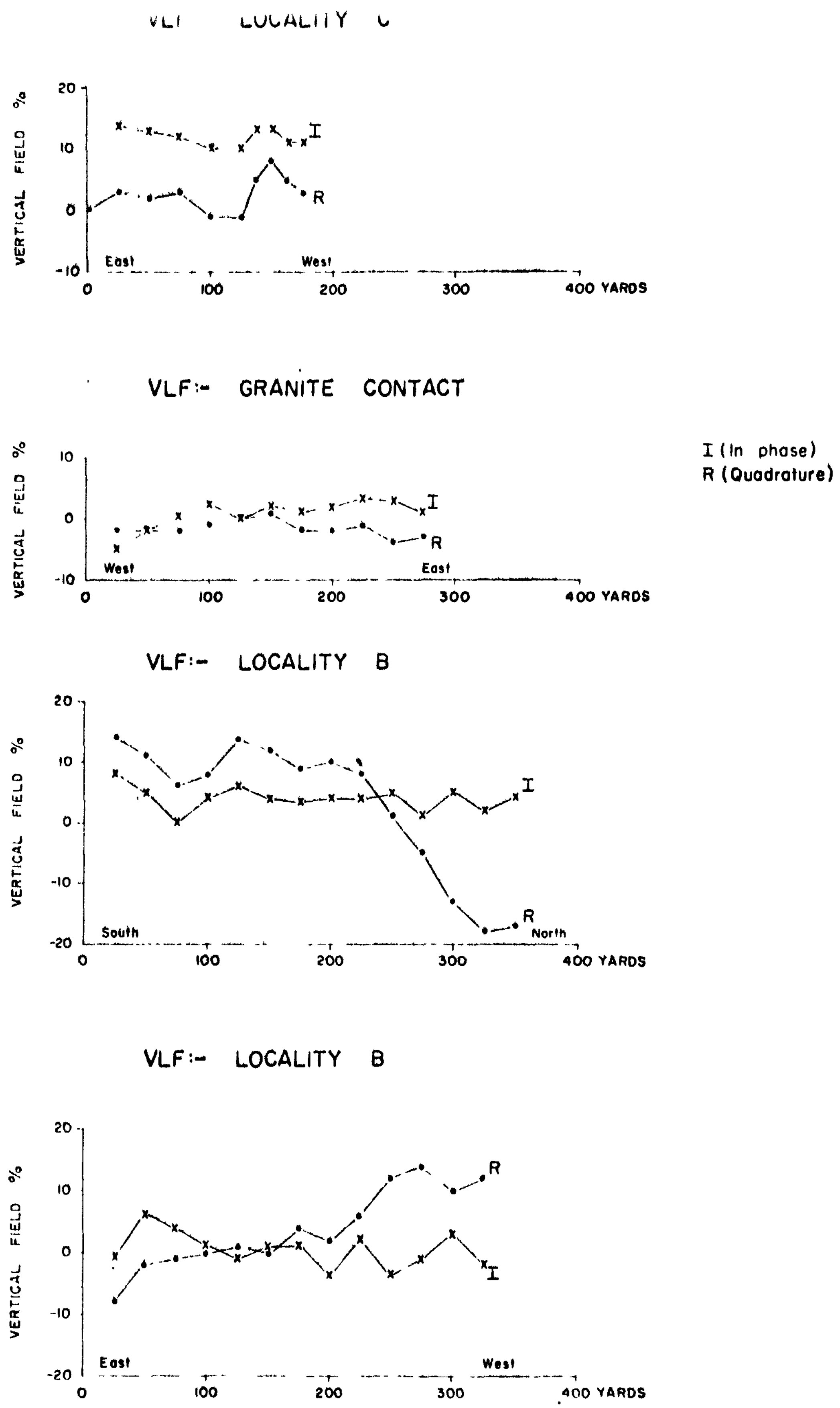


MAGNETOMETER:- LOCALITY A (ii)



GEOPHYSICAL PROFILES AT LOCALITY A

FIGURE 8



GEOPHYSICAL PROFILES AT LOCALITIES B & C, AND ACROSS THE GRUDIE GRANITE MARGIN

FIGURE 9

63/3

ROBERTSON RESEARCH INTERNATIONAL LIMITED

REPORT NO. 735

RECONNAISSANCE MINERAL SURVEY OF THE ROSEHALL AREA, NORTHERN SCOTLAND

by

D. W. MATTHEWS, M.A., Ph.D., F.G.S., A.M.I.M.M.

P. IBBOTSON, Ph.D., D.I.C., B.Sc., A.R.C.S., F.G.S., A.M.I.M.M.

D. PATRICK, Ph.D., B.Sc., F.G.S.

Project No. RRI/IIIA/723/20

May, 1972

Prepared for :

Oykell Minerals Limited,
G.P.O. Box 4817,
Sydney,
New South Wales 2001,
AUSTRALIA.

C O N T E N T S

TEXT FIGURES

ENCLOSURES

INTRODUCTION

A reconnaissance mineral survey of the Strath Oykel area of southern Sutherland, Scotland, was undertaken for Oykel Minerals Limited. Initially work was commissioned on the areas numbered 2 and 3 on Figure 1. As initial results were promising, the sample density was increased and the survey was also extended to the western part of area 4. Some trial geophysics was carried out to test the applicability of various methods to the Rosehall environment and type of mineralisation.

Subsequently the remaining parts of area 4 and Glen Rossal and Glen Cassley estates were surveyed. Access for stream sediment sampling only was arranged on these two estates, but similar arrangements could not be made for Sallachy or Ben More estates on which some geochemical interest is indicated.

The work covered by this report represents Phase I of an appraisal of the mineral potential at Rosehall, and was designed to locate target areas for detailed investigations.

Recommendations are given for further studies in the area based on the results obtained from the work to date.

II

GEOLOGICAL APPRAISAL

Geological investigations at Rosehall are hampered by the almost total lack of exposure. Much of the higher ground is covered by glacial till and thin (less than 2m) but extensive wet peat. The lower ground on the valley sides is covered largely by dense reafforestation. Good exposures occur locally in some stream cuttings, but the overall percentage outcrop is less than 1%. This factor will be the major problem facing further more detailed mineral exploration.

Only a few rock types crop out in the Oykel area. Almost all the area is underlain by Precambrian Moine metasediments, which in central northern Scotland consist of lithologically uniform psammitic schists with occasional thin bands of pelitic schist and sheets of basic hornblende schist. The psammites are chiefly quartz rocks with a little feldspar and muscovite, whilst the pelites are muscovite-biotite-quartz rocks with a little feldspar. The basic schists have been observed at only two places near Rosehall, but in this part of Scotland they generally occur as concordant sheets within the psammites; they consist almost entirely of hornblende with accessary feldspar and quartz.

The Moine schists were extensively metamorphosed and folded during the Caledonian orogeny, and now generally dip south at 35^{o} to 90^{o}. Local variations in attitude result from small scale folding. Some faulting and brecciation and also quartz veining probably of late Caledonian age are seen in places. The poor exposure at Rosehall does not permit detailed description of structures within the area.

Regionally, however, the major folding is generally isoclinal with a west-northwest strike and axial plane dip to the south-southwest. The faulting apparently tends to strike northeasterly near Rosehall, but no such regularity has been observed in the Cassley area. Quartz-feldspar veins and segregations vary from perfectly concordant lenses to cross-cutting veins perpendicular to the schistosity. Possibly some major northwesterly trending topographic lineations also have structural significance, Glen Cassley being the best example. Crush zones occur on the east side of Glen Cassley, and particularly between Glen Shiela and Glen Rossal, and consist of brecciated psammite with a siliceous matrix. These may have exerted some control on the topography. They do not, however, contain any evidence of metalliferous mineralisation. In general quartz veins and quartz-rich breccias near Rosehall are totally devoid of mineralisation and are probably a late stage metamorphic phenomenon pre-dating the hydrothermal mineralisation.

A small granite mass intruded into the Moine schists at Meall a'Ghruididh (Grudie Hill), is apparently a steep sided boss. Exposure is poor, but the granite margin mapped on indirect evidence, is shown on Figure 2. Petrographically, the rock is an adamellite consisting of feldspar and quartz with only small amounts of biotite and muscovite, with accessary fluorite, sphene, zircon, apatite and opaque minerals. It is characterised by abundant rounded 'phenocrysts' of quartz and is conspicuously microlitic in places. The shape of the Grudie granite mass and its relation to the nearby Lairg granite are debatable. One author (Newman, 1971) suggested that the Grudie granite is the exposed part of a western continuation of the Lairg granite. In this report the Grudie granite is regarded as one of several 'Newer' or late Caledonian granite masses in this part of northeast Scotland. It is petrographically quite distinct from the nearby Lairg granodiorite.

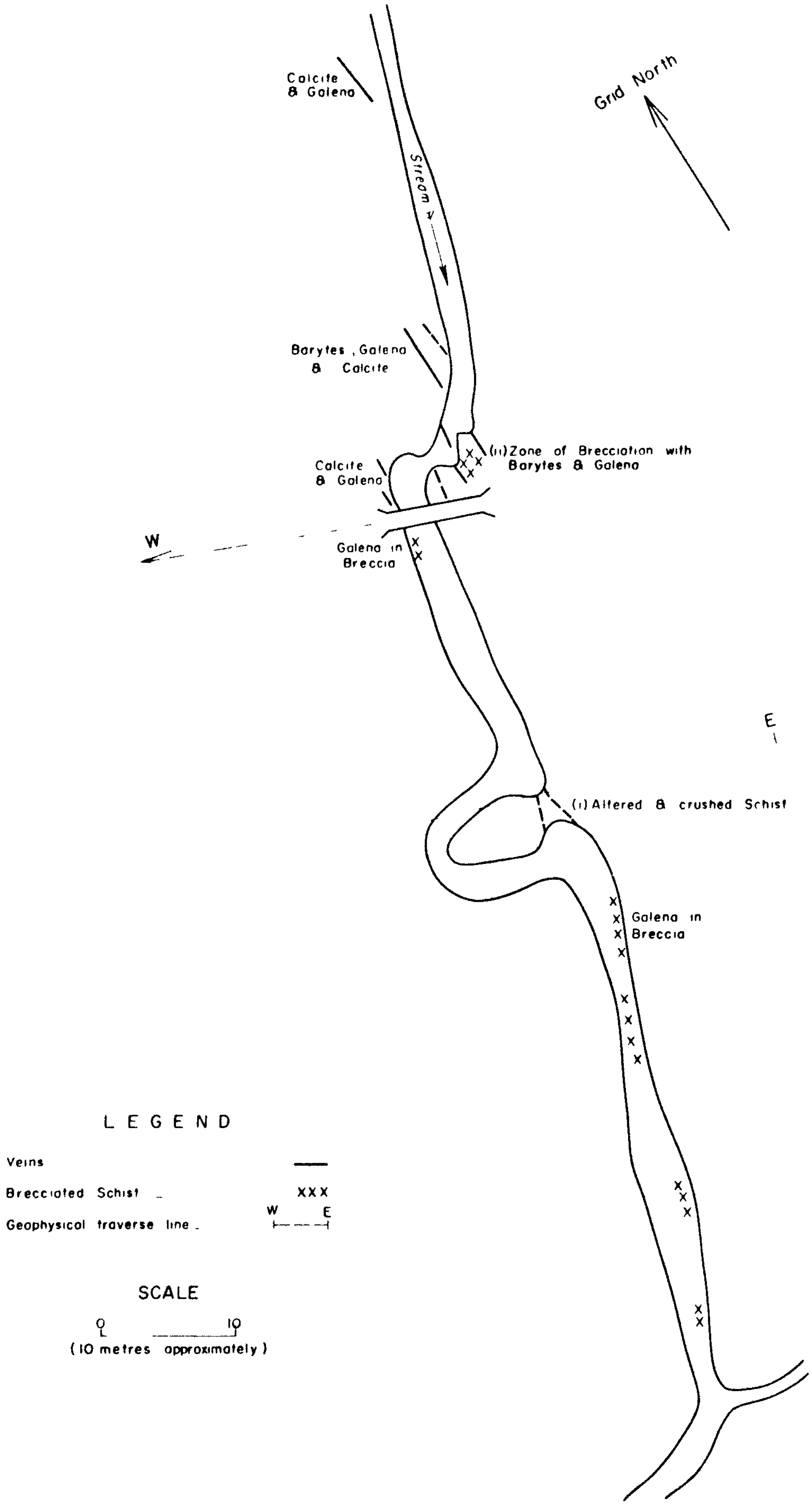
Published records of mineralisation in the Lairg area are numerous, the latest and most detailed describing a study of part of the Grudie Burn and the southeast part of the Grudie granite (locality X on Figure 2) by the Institute of Geological Sciences. However, all these records pertain to occurrences outside the present survey area. The following mineral occurrences are apparently all new discoveries. They contribute significantly to the knowledge of the mineralisation of the whole region.

Locality A

This, the most extensive mineral occurrence in the area, is exposed for about 100 metres in a stream channel part of which is a deep rocky gorge (Figure 3). The stream follows a northeasterly trending fault zone, but upstream and downstream the stream curves away and the fault probably dies out. The lower half of the gorge contains intermittent exposures of brecciated but unaltered schists with a little barytes, calcite, quartz and sporadic galena. This breccia widens to approximately 1 metre towards point (i) on Figure 3. At point (i), the stream forms a small loop, the narrow neck of which is occupied by brecciated, mylonitised and hydrothermally altered schists, which contain minute specks of pyrite, sericite, clay minerals and epidote. The vein thins rapidly northwards from 2 metres to 0.5 metres. Further upstream near the bridge, hard breccia with galena and barytes crops out, and under the bridge, two very narrow veinlets carry barytes, calcite and an estimated 2-5% galena. Just upstream from the bridge an irregular zone of broken and brecciated schists is 3 metres wide and veined and impregnated with barytes and stringers of galena. The zone apparently thins rapidly or is displaced by a fracture in the stream bed. It continues on the opposite bank, is less than 10 cms wide and contains barytes and galena with a lttle calcite and quartz. An adjacent vein has a similar mineralogy. Upstream, another vein is up to 5 cms wide and 3 metres long; it contains barytes and up to 10% galena. These small veins have the appearance of tension gashes and are associated with only minor brecciation of the otherwise unaltered schists.

Locality B

Here, mineralisation occurs in erratic blocks, one being strongly



DETAIL SKETCH MAP OF LOCALITY 'A'

FIGURE 3

brecciated schist with approximately 50% of coarsely disseminated galena. Another erratic is silicified and contains abundant pyrite.

Locality C

This isolated occurrence of slightly brecciated and altered schist occurs as a thin (20 cms) vertical band striking north-eastwards for approximately 5 metres in a stream channel. The schists contain scarce disseminated flakes of molybdenite and pyrite, and a coating of specular hematite on some joint surfaces.

Locality D

Downstream from locality C, the schist has a generally altered appearance. A set of well developed rectangular joint planes, particularly those striking northeast, are widened to approximately 1 cm and filled with crystalline barytes. This exposure is approximately 3 metres long.

Locality E

Downstream from locality D a single exposure of a massive vein 1 metre wide, dips almost vertically westwards. It consists of barytes and calcite with traces of hematite staining but with no visible sulphides. The wallrock schists are not brecciated, but are conspicuously altered over a width of approximately 10 cms with development of epidote and sericite, and the breakdown of feldspar.

Locality F

This very small isolated occurrence is situated in a small stream cutting. It consists of a very narrow (approximately 5 cms) zone of crushing and brecciation in typical psammitic schists, and contains purple fluorite and a little quartz and calcite.

Locality G

The gorge of the Allt Mor river follows a major northeasterly fracture zone and contains numerous veins. In general, however, the upper part of the gorge shows less evidence of fracturing than the lower half and is dominated by barren calcite veins with red hematite staining. At locality G pyrite forms up to 50% of the lenses and veins in which it occurs. Also thin fractures trending slightly west of north are filled with propylitised material.

Locality H

Lower down the Allt Mor gorge, brecciation and shattering of the schist becomes more pronounced and locally forms a 25 metre wide zone. Within this zone, lenses of black hematite are common, and hematite and other oxides also form a matrix material in the breccia. Calcite is present sporadically, and some pure calcite veins also occur. At locality H, a single lens of iron and manganese oxides is 15 cms thick and nearly 2 metres long.

In general, this reconnaissance survey has revealed three new areas of sulphide mineralisation, one of oxide mineralisation, and a number of other features of interest scattered over nearly 20 square kilometres. Each individual occurrence is associated with fracturing, but no overall fracture pattern can be postulated at this stage. Hydrothermal activity is clearly associated with the mineralisation at some localities although in the Allt Mor section there is a change from sulphide to oxide mineralisation in two miles of the gorge length. With so little wallrock alteration, the veins were probably emplaced at relatively low temperatures. Alternatively the veins may be exposed at a comparatively high structural level in relation to the source of the hydrothermal solutions. A larger vein system may still be buried. The occurrence of disseminated molybdenite is not spatially related to any vein occurrences, and the genesis of the molybdenite in relation to that of galena and barytes remains uncertain.

III

GEOCHEMICAL RECONNAISSANCE

Stream sediment sampling was undertaken on the second and third order streams which drain much of the area although some large tracts of higher ground have no channeled drainage. All accessible stream confluences were sampled and intermediate samples were taken at 200 to 400 metre intervals depending on the abundance of sediment. In some places, particularly the upper reaches of the Grudie Burn, sediment is generally scarce because the streams run entirely in peat. This has reduced the sample coverage substantially.

The samples, usually of active sediment, were dried, rolled, and sieved to -80 mesh. Half of the -80 fraction was used in analysis for Cu, Pb and Zn by atomic absorption methods; the other half was crushed to -200 mesh and retained for possible analysis by emission spectrography for molybdenum (Mo), tungsten (W), tin (Sn), nickel (Ni), cobalt (Co), chromium (Cr), silver (Ag), bismuth (Bi), vanadium (V), barium (Ba), manganese (Mn), and titanium (Ti). Only those samples from areas 2 and 3 with high levels of Zn were in fact analysed spectrographically for the other elements. All the analytical results are tabulated in Appendices 1 and 2.

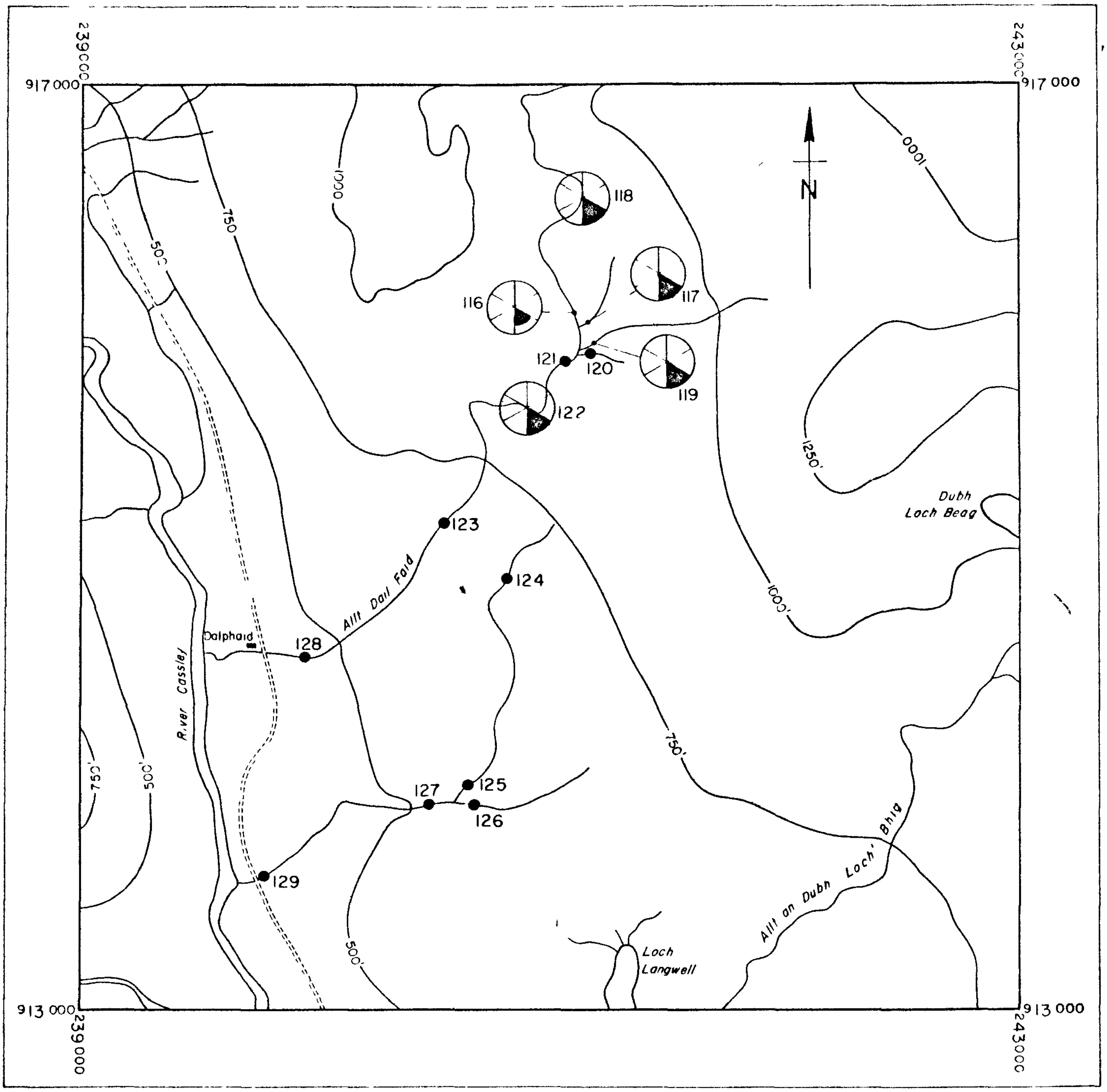
The interpretation of the Cu, Pb and Zn values has been done by statistical methods. There is little lithological variation within the area and distribution curves for all values for each element were found to be essentially unimodal. Mean values and standard deviations were calculated after elimination of the extremely high values which normally form about 5% of the total. The interpretation was based on a threshold value for possibly anomalous samples at mean plus two standard deviations and probably anomalous values of mean plus three standard deviations. The values thus obtained are given as follows :

	Threshold Values	Probably Anomalous Values
Lead	60 ppm	≥ 75 ppm
Copper	35 ppm	≥ 45 ppm
Zinc	170 ppm	≥200 ppm

The sample values are plotted as background, possibly anomalous and probably anomalous categories on Enclosures 1-10. The results of sampling in Allt Dail Faid are shown on Figure 4.

Because only samples from areas 2 and 3 with Zn levels >150 ppm were spectrographically analysed, a statistical treatment of the spectrographic results would be invalid. The threshold values have therefore been derived from subjective treatment of the data and from our overall experience of geochemical reconnaissance in Scotland. Possibly anomalous values have been plotted on the enclosures. Probably anomalous values have been distinguished for Mo and Sn only. These values are as follows :

	Threshold Values	Probably Anomalous Values
Molybdenum	3 ppm	≥20 ppm
Tin	5 ppm	≥50 ppm
Nickel	70 ppm	
Cobalt	30 ppm	
Chromium	150 ppm	
Silver	1 ppm	
Vanadium	150 ppm	
Barium	0.15%	
Manganese	1.0%	
Titanium	1.3%	



GEOCHEMICAL SAMPLING IN ALLT DAIL FAID

APPROXIMATE SCALE : 2½ INCHES TO 1 MILE

For Legend refer to Enclosures 1 – 10

FIGURE 4

Tungsten and bismuth values were consistently below the analytical detection limits of 50 and 5 ppm respectively. A consideration of all the geochemical results is contained in Chapter V, and the main anomalous areas are shown on Figure 5.

In order to assess the possible occurrence of disseminated metallic minerals in the psammitic schists, some rock chip sampling was carried out in areas of relatively good exposure west of the Grudie granite. However, exposure was still too poor to allow regular grid sampling. Sample locations are given on the enclosures, and analytical results are listed in Appendix 1. These results only show high values in the vicinity of locality A described in Section II.

Investigations were also made on hand-augered samples of drift from beneath the peat. The samples were obtained near certain veins and around the supposed margin of the Grudie granite. The sample points are shown on the enclosures. All the samples were taken from the surface of the glacial drift. Geochemical analyses of their -80 mesh content are given in Appendix 1. Applying the threshold values previously described, one sample from near the Grudie granite (sample 19715) has possibly anomalous lead, and one sample (19704) has probably anomalous copper. Two samples with possibly anomalous lead values (19721, 19722), one with a probably anomalous lead value (19732) and one with a probably anomalous copper value (19731) were taken in the vicinity of locality A, described in Section II. Sample 19761 was taken near the stream adjacent to Allt a'Choire and contains a possibly anomalous copper value. This supports the probably anomalous copper values noted in sediment samples from the stream. Drift sampling could probably be applied usefully to other parts of the survey area.

IV

GEOPHYSICAL RECONNAISSANCE

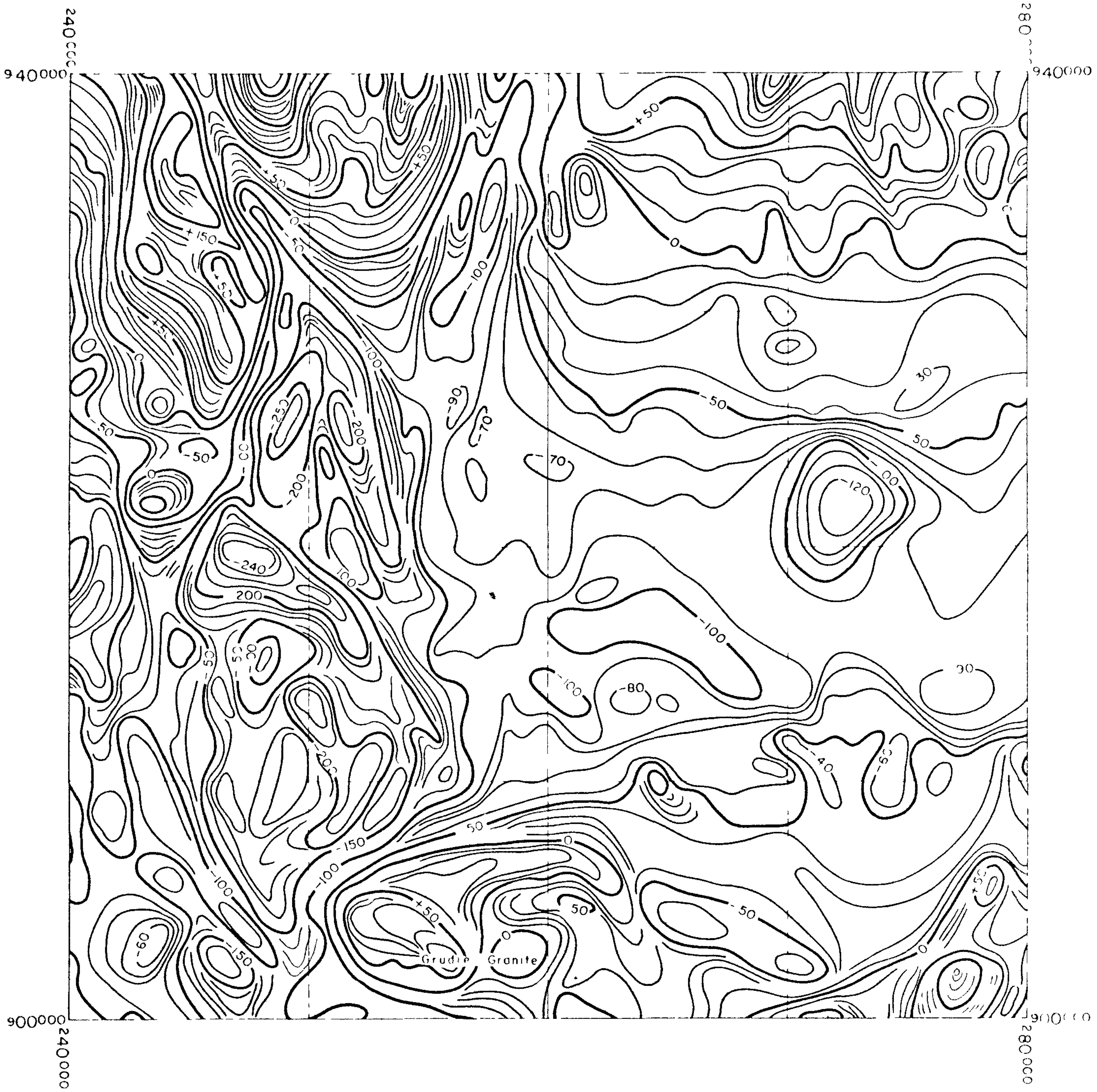
Geophysical work was carried out in two separate stages. Firstly, a ratemeter and a Minimag vertical field magnetometer were carried on all initial stream sample lines and on some intermediate traverses for chip samples. Readings were taken at sample points and at some intermediate stations. Ratemeter readings were uniformly very low at less than 5 μR/hour even over the granite, and the magnetometer readings showed only random variations of up to 500 gamma which were not considered significant apart from confirming the absence of any very intense magnetic anomalies in the survey area.

Secondly, traverses made in selected areas aimed at testing the applicability of three geophysical methods to this type of mineralisation and environment, and at obtaining some idea of the order of magnitude of anomalies that might be detected. Very low frequency (VLF) and horizontal loop electromagnetic methods and total magnetic field intensity measurement were used.

The traverse lines are located on Figure 2 and profiles of these traverses for each method used are shown on Figures 6 to 9. The results on traverses 1 and 2 show that small anomalies can be repeated using the various methods and that there is correlation between geological and geochemical and geophysical interest. No significant anomalies were detected across the granite contact using the VLF method, or across the molybdenite mineralisation at locality C. A possible magnetic anomaly (but no reliable electromagnetic anomaly) was encountered at locality A.

Calculations from the magnitude of these anomalies indicate that on traverse 1, a conductor, probably disseminated with a conductivity of 4-11 mhos and vertical orientation is indicated at approximately 130 feet below ground level. This calculation is based on the horizontal loop results and is partly supported by the VLF data though the latter may be partly affected by the wet peat cover. On traverse 2, a similar interpretation gives a depth of 120 feet to the top of a conductor but the VLF profile is more clearly affected by overburden than in traverse 1. On other traverses, small VLF effects are probably due to surface slope and overburden, but would merit checking in a larger scale survey, particularly that a locality A. These results are discussed further in Chapter V.

Figure 10 shows air magnetic data over the Rosehall area as published by the Institute of Geological Sciences on a quarter inch scale. Superficially, the Grudie granite is represented as a circular mass with a northeasterly prolongation. The northwesterly striking Cassley feature is also very evident. A detailed interpretation of these data has not been made, but the air magnetic results could yield results relevant to further work in the Rosehall area.



AEROMAGNETIC MAP OF THE GRUDIE AREA (I.G.S.)

SCALE : 1 INCH to 4 MILES

FIGURE 10

V

DISCUSSION OF RESULTS

1. Geological Results

Seven new mineral occurrences have been located, and galena and pyrite also occur in some transported material. Since exposure is poor, the frequency of observed mineralisation is very encouraging.

The character of the mineralisation varies with locality. Galena is present as a major constituent at one locality, pyrite at one, molybdenite at one, fluorite at one, barytes at two, hematite at two and calcite at several. Molybdenite and fluorite each exist alone, but the other minerals occur in various assemblages.

The mineralisation is usually located in northeasterly striking fractures or fracture zones within the psammites, both as veins and as disseminations in fractured and brecciated schist. The schists are patchily hydrothermally altered, even in some apparently un-mineralised areas.

In general, these observations endorse published theories on the origin of similar mineral deposits in Northern Scotland. The veins are fracture controlled, and probably related to the emplacement of a late Caledonian granite. The mineralisation is hydrothermal and sulphide-bearing in character, although oxides are present at some localities. Possibly the level of exposure is structurally 'high', and mineral deposition may be more intense at deeper levels. Near Rosehall vein structures crop out approximately three miles from exposed granite but no mineral occurrences are exposed on or very near the western margin of the Grudie granite; however, a drift auger sample with a possibly anomalous lead content was taken from the northwestern margin and one with a probably anomalous copper content was taken from the southern margin. The latter also has a much higher than average background level of zinc and anomalous chromium. The few exposures indicate a general tendency for oxides to be found further from the granite and at lower topographic levels than the sulphide, but this is presently inconclusive.

2. Geochemical Results

The interpretation of the geochemical results is based on generally accepted statistical methods, though the threshold values obtained for copper, lead and zinc can be varied slightly according to the percentage of high values eliminated from the calculations. Since there is apparently little variation in the bedrock schists, the threshold values calculated on a regional basis appear valid for the whole survey area. The results of detailed sampling along anomalous streams suggest also that dispersion of the various metal concentrations is very limited, perhaps less than 0.5 km with the possible exception of zinc. On the basis of the threshold values used, groupings of anomalies in lead and zinc and to a lesser extent copper are conspicuous (Figure 5) and most of these groupings are considered geologically significant. Other samples with anomalous values are widely scattered and considered 'non-significant' on the present evidence. The zinc anomalies near Tullich may result from contamination from the surrounding farmland and houses, though high barium values also occur in this area. The three groupings in area 4, two of which are small and isolated and are in recently ploughed forestry land, are probably non-significant.

The spectrographic analyses indicate very conspicuous groupings of molybdenum anomalies at Caillaich, Grudie, Larmachan and Gorge (Figure 5). At these localities, which are close to the Grudie granite, zinc anomalies sometimes with lead or copper exist. A few anomalous cobalt, nickel, chromium and manganese values are also associated with anomalous levels of molybdenum. At Grudie, Achness, Allt Mor and Tullich anomalous barium levels occur further from the Grudie granite than the molybdenum anomalies. The Chatha lead-zinc anomaly is supported only by manganese. Isolated tin anomalies are near roads and habitation and are probably contaminated.

The effect of manganese on the concentration of other metals in stream sediments has been the subject of much published study, and the combination of a peaty environment and the many high manganese values obtained in this survey throws suspicion on the significance of some anomaly groupings. On the whole, however, the association between manganese and other metal anomalies is inconsistent, and with the possible exception of the Chatha anomaly, manganese 'scavenging' is not reckoned to be of major importance.

The manganese anomalies may in fact be due to the presence of oxides of iron and manganese similar to the Allt Mor occurrences. Similarly the cobalt, nickel and chromium anomalies may reflect the presence of basic schists.

The copper, lead and zinc results on Glen Cassley show two areas which merit further investigation. In the Loch Shiela area there are also anomalies in copper, lead and zinc, and further north scattered but high levels in zinc occur. The actual levels cannot be compared too closely with those of Newman (1971) because of improved standards of analysis, but the general distribution of possibly and probably anomalous samples is reasonably comparable with published work and confirms the east side of Glen Cassley as an important area of interest. Mineralisation has not been seen in Glen Cassley even though exposure is better than near Rosehall, but probably any mineralisation in Cassley would be an extension of the Grudie mineralisation.

Analysis of drift samples from near locality A revealed two with possibly anomalous values of lead, one with probably anomalous lead and chromium values and one with probably anomalous copper. One possibly anomalous lead value is supported by anomalous values of chromium, cobalt and vanadium; this may be the result of contamination from the nearby forestry track. On balance though, contamination is not considered a major factor here and the samples may indicate possible extensions to the known mineralisation.

Rock chip samples from the vein breccia of locality A contain high lead values, and a chip sample from unaltered psammite exposed upstream of locality A has a moderately high copper content; the latter strengthens the possibility of the extension of known mineralisation.

The geochemical results indicate several areas of metal potential in the Rosehall area. Molybdenum and less abundant copper anomalies occur close to the Grudie granite and barium anomalies further away. There is also an indication that the anomalies lie on northeasterly trending zones across the area; the same zones also contain the exposures of mineralisation, and have the same orientation as the regional fracture system. In the Glen Cassley area, however, the anomalies equally could have the northwesterly trend suggested in published work.

3. Geophysical Results

The geophysical traverses were very limited and were not designed to give major evidence to aid interpretation of the mineralisation of this area. Some conclusions are, however, possible :

a. Both traverses 1 and 2 show horizontal loop anomalies over a position which could lie on a continuation of the Allt Mor fracture zone. These anomalies would theoretically be consistent with the presence of conductive bodies at depths of 120 to 130 feet. A very small and more uncertain magnetic anomaly occurs at the same points.

   Both VLF and horizontal loop methods show anomalies at various points on other traverses, but these are not particularly conspicuous. They are possibly partly due to superficial phenomena such as ground slope and waterlogged peat. They cannot therefore be considered important until investigated in more detail.

VI

CONCLUSIONS AND RECOMMENDATIONS

Reconnaissance geological, geochemical and geophysical investigations in the Rosehall area have revealed an extensive tract of mineralised ground. It appears that low temperature hydrothermal vein type mineralisation, predominantly of a lead-zinc-barium nature but in some places associated with copper and fluorite, may occur in northeasterly trending zones between Rosehall and Grudie Hill. Disseminated molybdenite has also been noted near one of these zones. In the Glen Cassley area mineralisation could have a northwesterly control. The mineralisation which is contained in Moine psammitic schists is assumed to be related to the emplacement of the late Caledonian Grudie granite.

Where observed, the veins are generally thin and discontinuous though in one or two places the mineralised structures may be a few metres wide. Commonly there is no wall rock alteration, though an epidote assemblage has been identified in a few places. Locally, rocks that are hydrothermally altered but barren of sulphides crop out.

Evaluation of the mineral potential of the area requires further investigation to ascertain whether the zones of mineralisation are continuous, and what their width and sulphide content is both laterally and in depth. It is recommended that this potential is evaluated in the following ways:

1. Geophysical traverses utilising VLF and magnetic methods should be undertaken over the area west of the Grudie granite. The grid used should be 500 x 25 metres with fill-in traverses where necessary.

2. Concurrently with 1 above, a detailed interpretation of available air magnetic data should be undertaken to extract all pertinent data which could include information on the subsurface form of

the granite mass as well as important regional features.

3. If the results of 1 and 2 above prove satisfactory, geophysical investigations should be extended over the entire mineralised area and possibly some geochemical fill-in traverses conducted in the Cassley zone. The important geophysical anomalies should be drilled to the relevant target depth indicated by the geophysical investigations.

. As comparable mineralisation is recorded east of the Grudie granite and in areas to the southeast of Lairg, consideration should be given to extending reconnaissance investigations into these regions.

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APPENDIX 1

ANALYSES OF STREAM SEDIMENT, ROCK CHIP AND AUGER SAMPLES

Sample No.	Cu ppm	Pb ppm	Zn ppm
1. Stream Sediment Samples			
19,100	15	60	90
19,101	15	40	90
19,102	10	70	65
19,103	15	40	110
19,104	20	<20	100
19,105	<10	<20	70
19,106	<10	<20	20
19,107	<10	20	25
19,108	<10	60	130
19,109	<10	<20	65
19,110	<10	30	25
19,111	<10	<20	30
19,112	<10	<20	50
19,113	<10	30	110
19,114	<10	20	60
19,115	30	<20	45
19,116	10	<20	100
19,117	15	30	120
19,118	<10	20	30
19,119	15	30	120
19,120	10	20	70
19,121	10	30	80
19,122	10	20	65
19,123	30	50	70
19,124	35	30	85
19,125	10	<20	70
19,126	60	30	120
19,127	65	50	100
19,128	60	30	60
19,129	60	20	350
19,130	15	30	210
19,131	10	20	170
19,132	20	20	130
19,133	10	<20	210
19,134	10	<20	75
19,150	10	<20	20
19,151	<10	<20	15
19,152	<10	<20	25
19,153	<10	20	65
19,154	<10	30	60
19,155	<10	30	40
19,156	<10	20	40
19,157	<10	30	45
19,158	<10	50	40
19,159	<10	20	20
19,160	<10	30	35

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,161	<10	30	50
19,162	20	20	45
19,163	10	<20	50
19,164	10	<20	140
19,165	<10	<20	80
19,166	<10	<20	75
19,167	<10	20	30
19,168	<10	<20	410
19,750	20	50	120
19,751	INSUFFICIENT	SAMPLE	
19,752	INSUFFICIENT	SAMPLE	
19,753	10	40	90
19,754	20	<20	130
19,755	20	<20	130
19,756	15	20	110
19,757	20	30	190

Samples 19758 to 19763 inclusive are detailed later under Auger samples

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,764	15	60	120
19,765	10	40	170
19,766	15	30	140
19,767	10	20	240
19,768	10	30	75
19,769	<10	20	60
19,770	10	20	60
19,771	10	20	50
19,772	<10	20	45
19,773	10	30	50
19,774	10	20	65
19,775	<10	30	65
19,776	<10	20	55
19,777	10	20	40
19,778	10	30	70
19,779	15	<20	45
19,780	15	20	50
19,781	10	30	45
19,782	10	<20	150
19,783	20	20	400
19,784	20	20	90
19,785	15	<20	180
19,786	15	<20	65
19,787	20	<20	90
19,788	150	20	140
19,789	15	<20	50
19,790	10	<20	50
19,791	15	110	60
19,792	10	120	50

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,793	10	20	75
19,794	15	30	45
19,795	10	20	60
19,796	10	30	55
19,797	10	< 20	40
19,798	< 10	20	65
19,799	10	< 20	45
19,800	10	< 20	70
19,801	15	30	95
19,802	15	< 20	55
19,803	15	< 20	75
19,804	15	< 20	90
19,805	15	< 20	35
19,806	20	20	50
19,807	10	< 20	60
19,808	15	< 20	75
19,809	20	30	45
19,810	15	20	45
19,811	15	20	70
19,812	20	30	85
19,813	20	20	75
19,814	15	20	60
19,815	10	20	70
19,816	20	< 20	85
19,817	15	20	80
19,818	15	< 20	60
19,819	15	20	65
19,820	15	30	70
19,821	20	< 20	85
19,822	10	20	70
19,823	20	< 20	65
19,824	20	< 20	65
19,825	15	< 20	60
19,826	15	< 20	45
19,827	15	< 20	50
19,828	15	< 20	130
19,829	15	30	120
19,830	15	< 20	170
19,831	20	< 20	120
19,832	20	< 20	80
19,833	15	< 20	75
19,834	20	20	70
19,835	< 10	30	160
19,836	< 10	20	110
19,837	< 10	40	190
19,838	< 10	30	120
19,839	< 10	30	110
19,843	< 10	30	160
19,844	10	60	160

APPENDIX 1 **Continued**

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,845	20	60	110
19,846	25	50	80
19,847	10	40	60
19,848	10	20	30
19,849	20	30	25
19,850	<10	30	65
19,851	15	30	95
19,852	<10	30	90
19,853	<10	40	300
19,854	<10	40	100
19,855	20	30	95
19,856	15	20	60
19,857	10	<20	60
19,858	20	40	170
19,859	15	30	100
19,860	<10	20	50
19,861	35	80	180
19,862	10	20	65
19,863	<10	<20	15
19,864	<10	<20	25
19,865	<10	30	60
19,866	<10	30	50
19,867	15	30	50
19,868	10	20	90
19,869	10	30	100
19,870	10	30	85
19,871	<10	20	15
19,872	<10	<20	10
19,873	10	20	35
19,874	<10	30	30
19,875	<10	20	140
19,876	<10	20	40
19,877	280	<20	220
19,878	<10	20	100
19,879	<10	20	30
19,880	<10	30	150
19,881	<10	20	100
19,882	<10	<20	45
19,883	NO	SAMPLE	
19,884	<10	40	50
19,885	<10	40	170
19,886	<10	40	110
19,887	<10	30	370
19,888	<10	20	330
19,889	<10	40	110
19,890	<10	30	240
19,891	<10	30	380
19,892	15	30	320
19,893	<10	30	120
19,894	<10	<20	300
19,895	<10	20	170
19,896	<10	30	120

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,897	< 10	20	110
19,898	< 10	< 20	20
19,899	< 10	30	50
19,900	< 10	< 20	15
19,901	< 10	< 20	20
19,902	10	30	85
19,903	< 10	30	55
19,904	15	60	70
19,905	< 10	< 20	20
19,906	< 10	40	100
19,907	< 10	50	100
19,908	< 10	< 20	15
19,909	< 10	30	110
19,910	< 10	< 20	20
19,911	< 10	30	60
19,912	< 10	< 20	75
19,913	< 10	20	60
19,914	< 10	< 20	45
19,915	< 10	< 20	20
19,916	< 10	40	60
19,917	< 10	< 20	30
19,918	< 10	40	40
19,919	< 10	20	55
19,920	< 10	< 20	40
19,921	< 10	< 20	20
19,922	< 10	< 20	10
19,923	15	40	210
19,924	< 10	40	40
19,925	< 10	30	25
19,926	< 10	< 20	15
19,927	< 10	< 20	15
19,928	< 10	< 20	25
19,929	< 10	< 20	10
19,930	< 10	< 20	10
19,931	10	< 20	40
19,932	< 10	< 20	30
19,933	< 10	< 20	40
19,934	< 10	< 20	80
19,935	10	40	180
19,936	< 10	30	160
19,937	10	30	170
19,938	10	30	200
19,939	20	30	180
19,940	10	20	130
19,941	< 10	30	40
19,942	10	40	85
19,943	< 10	20	40
19,944	< 10	30	60
19,945	< 10	20	60
19,946	10	330	100
19,947	< 10	380	160
19,948	< 10	110	80

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,949	< 10	20	440
19,950	10	20	55
19,951	15	< 20	35
19,952	< 10	< 20	10
19,953	35	30	55
19,954	20	< 20	55
19,955	10	< 20	25
19,956	< 10	30	65
19,957	< 10	30	40
19,958	< 10	30	35
19,959	< 10	< 20	15
19,960	< 10	40	65
19,961	< 10	50	50
19,962	10	40	65
19,963	10	40	85
19,964	< 10	30	100
19,965	30	30	330
19,966	15	< 20	90
19,967	10	< 20	30
19,968	20	< 20	45
19,969	10	30	35
19,970	10	< 20	20
19,971	< 10	< 20	20
19,972	< 10	< 20	45
19,973	< 10	30	130
19,974	< 10	< 20	20
19,975	< 10	< 20	215
19,976	< 10	20	190
19,977	10	40	300
19,979	< 10	< 20	60
19,980	< 10	< 20	40
19,981	10	< 20	40
19,982	10	20	70
19,983	< 10	< 20	20
19,984	< 10	< 20	40
19,985	< 10	< 20	40
19,986	< 10	< 20	40
19,987	< 10	< 20	15
19,988	< 10	< 20	75
19,989	< 10	< 20	25
19,990	< 10	< 20	60
19,991	< 10	< 20	45
19,992	< 10	< 20	35
19,993	< 10	< 20	35
19,994	< 10	< 20	50
19,995	< 10	< 20	50
19,996	< 10	< 20	40
19,997	< 10	< 20	35
19,998	< 10	< 20	60

APPENDIX 1 Continued

NOTE: Samples 19,999 to 20,129 are from the Upper Glen Cassley Area.

Sample No.	Cu ppm	Pb ppm	Zn ppm
19,999	< 10	20	60
20,000	< 10	30	110
20,001	< 10	50	110
20,002	< 10	< 20	30
20,003	< 10	20	40
20,004	< 10	< 20	65
20,005	< 10	20	70
20,006	10	40	75
20,007	10	50	140
20,008	< 10	20	30
20,009	10	30	50
20,010	10	50	120
20,011	10	30	60
20,012	10	40	80
20,013	10	30	60
20,014	15	60	150
20,015	15	50	150
20,016	15	60	160
20,017	10	50	160
20,018	10	60	150
20,019	15	50	170
20,020	20	60	120
20,021	90	70	130
20,022	15	50	160
20,023	30	50	140
20,024	30	40	140
20,025	25	40	120
20,026	10	30	80
20,027	20	60	140
20,028	10	40	120
20,029	10	50	160
20,030	10	40	160
20,031	10	40	150
20,032	10	40	180
20,033	10	50	65
20,034	10	50	160
20,035	< 10	60	170
20,036	< 10	40	160
20,037	10	30	170
20,038	15	50	170
20,039	10	20	340
20,040	10	30	70
20,041	< 10	40	60
20,042	10	20	90
20,043	10	30	40
20,044	< 10	< 20	110
20,045	10	< 20	210
20,046	10	40	390
20,047	< 10	< 20	130
20,048	< 10	40	100

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
20,049	< 10	60	120
20,050	10	40	80
20,051	< 10	< 20	200
20,052	10	20	200
20,053	10	30	500
20,054	10	40	170
20,055	15	90	500
20,056	10	40	320
20,057	20	20	50
20,058	20	30	50
20,059	10	20	40
20,060	10	20	40
20,061	10	< 20	110
20,062	< 10	20	80
20,063	10	30	150
20,064	10	30	130
20,065	10	30	70
20,066	10	30	90
20,067	< 10	30	120
20,068	10	40	120
20,069	15	20	200
20,070	10	30	90
20,071	10	< 20	220
20,072	< 10	20	160
20,073	< 10	< 20	140
20,074	< 10	< 20	130
20,075	10	20	70
20,076	10	< 20	90
20,077	10	20	70
20,078	15	30	80
20,079	10	20	100
20,080	10	20	150
20,081	< 10	< 20	120
20,082	< 10	20	180
20,083	10	30	180
20,084	10	30	110
20,085	< 10	< 20	110
20,086	< 10	40	100
20,087	< 10	40	110
20,088	10	50	100
20,089	10	20	130
20,090	10	20	190
20,091	< 10	20	300
20,092	< 10	< 20	80
20,093	10	< 20	90
20,094	< 10	< 20	40
20,095	< 10	< 20	90
20,116	10	30	170
20,117	10	< 20	230
20,118	10	50	260
20,119	15	30	200

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
20,120	10	20	75
20,121	< 10	< 20	60
20,122	10	30	230
20,123	10	30	90
20,124	10	20	60
20,125	15	20	150
20,126	10	30	70
20,127	< 10	20	60
20,128	10	< 20	90
20,129	10	< 20	10
20,361	15	20	70
20,362	20	< 20	100
20,363	25	20	110
20,364	15	20	90
20,365	20	< 20	90
20,366	85	60	160
20,367	30	30	220
20,368	45	40	210
20,369	60	40	170
20,370	45	30	150
20,371	10	30	80
20,372	15	20	80
20,373	20	30	60
20,374	15	< 20	65
20,375	20	< 20	75
20,376	15	20	40
20,377	< 10	20	30
20,378	< 10	20	50
20,379	55	30	100
20,380	10	< 20	75
20,381	75	30	150
20,382	70	20	45
20,383	80	20	60
20,384	10	30	70
20,385	35	20	60
20,386	< 10	40	70
20,387	10	40	80
20,388	10	30	190
20,389	25	30	120
20,390	10	< 20	60
20,391	10	30	70
20,392	10	< 20	80
20,393	10	30	80
20,394	10	20	120
20,395	35	60	80
20,396	10	30	90
20,397	10	20	160
20,398	10	70	150
20,399	15	50	110
20,400	10	20	340
20,405	10	60	130

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
20,406	10	< 20	80
20,407	15	40	100
20,408	15	20	50
20,409	20	110	110
20,410	10	40	60
20,411	25	80	70
20,412	10	< 20	340
20,413	20	30	110
20,414	20	20	100
20,415	20	20	100
20,416	15	50	140
20,417	25	30	110
20,418	15	40	60
20,419	20	40	100
20,420	15	70	60
20,421	20	60	120
20,422	30	110	160
20,423	10	< 20	30
20,424	15	< 20	60
20,425	20	< 20	100
20,426	20	< 20	100
20,427	25	< 20	100
20,428	20	< 20	100
20,429	20	20	100
20,430	30	90	230
20,431	25	70	230
20,432	25	50	200
20,433	10	60	120
20,434	20	60	70
20,435	15	< 20	110
20,436	15	20	90
20,437	20	20	140
20,439	15	20	160
20,440	25	20	150
20,441	20	< 20	70
20,442	20	< 20	160
20,443	35	40	90
20,444	20	30	120
20,445	15	< 20	120
20,446	25	< 20	180
20,447	10	< 20	110
20,448	20	< 20	80
20,449	15	< 20	150
20,450	20	< 20	240
20,451	25	< 20	340
20,452	20	20	100
20,453	15	< 20	130
20,454	10	< 20	100
20,455	20	20	340
20,456	25	60	240
20,457	10	40	130
20,458	15	30	190

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
20,459	15	40	120
20,460	15	20	90
20,461	15	< 20	60
20,462	10	< 20	70
20,463	10	< 20	90
20,464	15	20	70
20,465	25	50	120
20,466	15	30	90
20,467	25	30	110
20,468	15	< 20	70
20,469	15	< 20	130
20,470	50	60	220
20,471	15	< 20	80
20,472	10	< 20	70
20,473	10	20	60
20,474	10	20	50
20,475	15	30	130
20,476	10	20	170
20,477	10	30	70
20,478	15	30	150
20,479	15	< 20	120
20,480	10	< 20	40
20,481	10	< 20	30
20,482	< 10	< 20	50
20,483	10	< 20	130
20,484	10	< 20	80
20,485	10	50	80
20,486	10	30	80
20,487	40	20	90
20,488	10	30	50
20,489	10	20	30
20,490	10	20	20
20,491	15	< 20	60
20,492	10	20	50
20,493	< 10	20	40
20,494	10	20	40
20,495	10	< 20	40
20,496	15	20	70
20,497	< 10	20	30
20,498	10	20	15
20,499	10	< 20	20
20,500	15	< 20	20
20,636	90	20	120
20,637	10	30	20
20,638	20	30	60
20,639	95	50	140
20,640	20	50	30
20,641	25	60	120
20,642	60	20	50
20,643	100	30	80
20,644	60	30	90
20,645	15	60	50

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
20,646	25	100	150
20,647	15	30	70
20,648	25	100	150
20,654	15	50	100
20,655	15	30	200
20,656	10	20	60
20,657	20	20	110
20,658	20	50	80
20,659	15	40	140
20,660	15	30	360
20,661	15	40	80
20,662	15	40	70
20,663	15	30	140
20,664	15	20	200
20,665	25	30	90
20,666	20	30	70
20,667	15	20	30
20,668	20	20	100
20,669	25	20	190
20,670	35	20	320
20,671	INSUFFICIENT SAMPLE		
20,672	20	30	40
20,673	20	80	80
20,674	20	40	30
20,675	20	50	90
20,676	15	20	30
20,677	25	80	80
20,678	30	50	130
20,679	10	30	80
20,680	10	30	40
20,681	15	20	100
20,682	15	30	250
20,683	10	30	30
20,684	10	20	10
20,685	25	30	100
20,686	20	30	80
20,687	30	40	90
20,688	25	30	70
20,689	20	30	80
20,690	10	60	100
20,691	10	60	110
20,692	25	80	120
20,693	15	< 20	150
20,694	15	20	160
20,695	15	< 20	180
20,696	15	< 20	110
20,697	15	20	50
20,698	15	< 20	340
20,699	15	< 20	210
20,700	15	20	220

APPENDIX 1 Continued

Sample No.	Cu ppm	Pb ppm	Zn ppm
2. Auger Samples			
20,137	< 10	20	10
20,138	< 10	20	10
20,139	< 10	20	15
20,140	< 10	20	10
20,141	< 10	50	10
20,142	< 10	20	10
20,143	< 10	20	10
20,144	< 10	20	10
19,700	10	30	20
19,701	< 10	20	20
19,702	10	20	10
19,703	10	20	15
19,704	50	20	100
19,705	< 10	20	10
19,706	< 10	20	10
19,707	20	20	30
19,708	10	20	25
19,709	15	20	15
19,710	10	30	20
19,711	10	20	10
19,712	15	20	15
19,713	10	30	15
19,714	25	20	25
19,715	15	60	30
19,716	10	20	25
19,717	10	20	10
19,718	10	20	10
19,719	10	20	10
19,720	15	20	10
19,721	25	60	70
19,722	30	60	110
19,723	25	50	55
19,724	15	30	30
19,725	25	40	50
19,726	10	20	15
19,727	25	20	20
19,728	30	20	45
19,729	30	20	40
19,730	15	30	40
19,731	45	50	75
19,732	25	150	120
19,733	10	30	80
19,734	20	20	70
19,758	30	< 20	75
19,759	15	< 20	30
19,760	20	< 20	50
19,761	35	< 20	55
19,762	15	< 20	35
19,763	10	< 20	60

APPENDIX 1 Continued

3. Chip Samples

Sample No.	Cu ppm	Pb ppm	Zn ppm
20,592	15	< 20	20
20,593	10	< 20	20
20,594	25	< 20	10
20,595	20	30	40
20,596	15	< 20	20
20,597	10	20	20
20,598	15	< 20	20
20,599	15	< 20	10
20,600	20	< 20	30
20,627	35	20	60
20,628	15	30	30
20,629	25	240	20
20,630	15	1600	40
20,631	10	20	50
20,632	10	< 20	10
20,633	20	< 20	20
20,634	15	20	< 10
20,635	15	< 20	40

APPENDIX 2

SPECTROGRAPHIC ANALYSES OF SELECTED SAMPLES FROM AREAS 2 AND 3

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
19100)	523067	5	<50	<5	10	5	50	<1	<5	50	0.05	1.0	0.1
19101)		12	<50	<5	30	10	100	<1	<5	100	0.1	1.0	0.3
19103	522068	7	<50	<5	10	10	100	<1	<5	100	0.1	1.5	0.2
19104	519070	10	<50	<5	30	10	100	<1	<5	150	<0.05	0.1	0.4
19108	516076	4	<50	15	15	15	100	<1	<5	50	0.2	5 approx	0.2
19113	535065	3	<50	5	10	5	100	<1	<5	30	0.1	2.5	0.1
19116)	529055	5	<50	<5	5	5	100	<1	<5	30	<0.05	1.0	0.1
19117)		20	<50	<5	15	20	100	<1	<5	70	0.1	1.5	0.3
19119	526055	15	<50	<5	15	12	200	<1	<5	70	0.1	1.5	0.3
19121	522055	12	<50	<5	10	7	200	<1	<5	50	<0.05	0.3	0.2
19124	521055	50	<50	<5	40	12	100	<1	<5	50	0.5	0.2	0.3
19126	514054	80	<50	<5	50	40	200	<1	<5	100	0.2	1.0	0.4
19127	518054	60	<50	<5	25	30	100	<1	<5	70	0.1	1.0	0.4
19129	515052	90	<50	20	35	45	100	<1	<5	50	0.1	4.0	0.2
19130)	513051	25	<50	5	15	12	50	<1	<5	30	0.1	2.0	0.2
19131)		25	<50	<5	10	10	50	<1	<5	30	0.1	2.0	0.2
19132	517054	20	<50	<5	10	10	50	<1	<5	30	0.1	1.0	0.2
19133	518056	35	<50	10	20	20	100	<1	<5	30	0.2	3.0	0.2
19164	515058	15	<50	<5	10	10	100	<1	<5	30	0.2	1.5	0.2
19165	512059	2	<50	<5	5	5	50	<1	<5	50	<0.05	0.5	0.1

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
*19693		<2	<50	5	25	15	150	<1	<5	200	<0.05	0.1	1.0
*19694		<2	<50	15	25	15	150	<1	<5	300	<0.05	0.2	1.0
*19695	CONTROL SAMPLES	9	<50	20	25	25	150	<1	<5	200	0.1	0.1	0.7
*19696		<2	<50	<5	100	<5	>>1000	2	<5	50	<0.05	0.01	<0.1
*19697		3	<50	<5	20	5	200	30	<5	50	<0.05	0.2	0.2
*19698		3	<50	<5	20	15	200	2	<5	30	<0.05	0.05	<0.1
*19699		1000	<50	<5	40	10	100	1	<5	70	<0.05	0.05	1.0
19704	533041	<2	<50	<5	30	7	300	<1	<5	100	<0.05	0.05	0.5
19722	478026	<2	<50	<5	40	30	300	<1	<5	150	<0.05	0.2	1.0
19732	478029	<2	<50	<5	25	10	300	<1	<5	100	0.05	0.05	1.0
19733	479029	2	<50	<5	<5	<5	100	<1	<5	70	<0.05	0.05	0.4
19750		6	<50	<5	15	15	150	<1	<5	70	0.5	2.0	0.4
19753	513018	7	<50	<5	10	10	100	<1	<5	70	>1	0.5	0.5
19754	514018	15	<50	<5	15	10	100	<1	<5	70	>1	0.5	0.5
19755	504015	2	<50	<5	15	15	100	<1	<5	70	0.1	1.0	0.5
19756		2	<50	<5	10	7	100	<1	<5	50	0.2	0.5	0.5
19757		4	<50	<5	25	15	100	<1	<5	70	0.1	1.5	0.5
20362	535025	15	<50	<5	25	15	300	<1	<5	70	0.1	1.5	0.5
20363		15	<50	<5	35	15	200	<1	<5	100	0.05	0.1	0.5
20366	531027	7	<50	5	40	20	300	<1	<5	100	0.2	0.2	0.5

*NOTE: Control samples are taken from outwith the Rosehall Area

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20367	529030	10	<50	<5	30	40	300	<1	<5	70	0.1	3.0	0.2
20368)		12	<50	<5	30	25	300	<1	<5	70	0.05	3.0	0.2
20369)	528032	17	<50	<5	90	15	400	<1	<5	100	<0.05	3.0	0.5
20370)		20	<50	<5	25	15	100	<1	<5	70	0.1	2.5	0.2
20371)	526035	12	<50	<5	15	15	50	<1	<5	70	<0.05	0.5	0.2
20372)		15	<50	<5	10	10	50	<1	<5	50	0.05	0.5	0.3
20379	529035	10	<50	<5	10	20	50	<1	<5	50	0.1	1.0	0.3
20381	529037	10	<50	<5	100	50	200	<1	<5	100	<0.05	0.2	1.0
20387)	522018	2	<50	<5	5	<5	50	<1	<5	40	<0.05	0.2	0.2
20388)		2	<50	<5	5	5	50	<1	<5	50	0.1	0.7	0.3
20389	524019	2	<50	<5	10	<5	50	<1	<5	50	<0.05	0.5	0.5
20392)		3	<50	<5	10	7	50	<1	<5	70	0.1	0.5	0.7
20393)	518020	10	<50	<5	10	7	50	<1	<5	70	0.1	0.3	0.5
20394)		4	<50	<5	10	10	50	<1	<5	70	0.1	1.0	0.5
20395)	517020	7	<50	<5	10	15	50	<1	<5	50	0.1	0.2	0.4
20396)		8	<50	<5	10	10	70	<1	<5	70	0.1	0.3	0.5
20397	517021	4	<50	<5	15	10	70	<1	<5	70	0.1	0.3	0.5
20398	520021	5	<50	<5	5	7	100	<1	<5	50	0.05	0.4	0.3
20399)	521023	12	<50	<5	10	15	100	<1	<5	70	0.1	0.3	0.5
20400)		10	<50	<5	10	25	100	<1	<5	50	0.1	1.0	0.3

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20405	521023	10	<50	<5	10	10	100	<1	<5	50	0.05	0.4	0.3
20406	521025	12	<50	<5	5	5	70	<1	<5	30	<0.05	0.2	0.2
20407	519025	15	<50	<5	10	5	70	<1	<5	40	0.05	0.2	0.3
20409		15	<50	<5	5	10	70	<1	<5	30	0.05	0.7	0.3
20412	50516	3	<50	<5	10	15	50	<1	<5	20	0.2	2.0	0.2
20413		3	<50	<5	10	10	70	<1	<5	70	0.3	0.3	0.5
20414		2	<50	<5	15	10	70	<1	<5	70	0.2	0.2	0.7
20415	506020	<2	<50	30	10	<5	70	<1	<5	70	0.1	0.1	0.5
20416	503017	<2	<50	10	10	10	70	<1	<5	50	0.1	0.3	0.5
20417	502017	<2	<50	<5	30	15	100	<1	<5	50	0.1	0.3	0.5
20419	469032	<2	<50	<5	20	15	70	<1	<5	50	0.1	0.2	0.5
20421	475025	<2	<50	<5	20	15	100	<1	<5	50	0.2	0.3	0.5
20422	480019	<2	<50	10	5	5	50	<1	<5	40	0.05	0.1	0.4
20425	478025	<2	<50	<5	30	10	100	<1	<5	50	0.1	0.1	0.5
20426		<2	<50	<5	20	10	100	<1	<5	40	0.1	0.3	0.3
20427	480025	<2	<50	<5	20	10	70	<1	<5	40	0.1	0.3	0.4
20428	482025	<2	<50	<5	20	15	70	<1	<5	40	0.1	0.3	0.4
20429	482026	<2	<50	<5	20	15	70	<1	<5	40	0.1	0.3	0.4
20430	478027	<2	<50	<5	40	20	100	<1	<5	40	0.1	1.0	0.4
20431	471029	<2	<50	<5	30	20	100	<1	<5	40	0.1	1.0	0.4

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20405	521023	10	<50	<5	10	10	100	<1	<5	50	0.05	0.4	0.3
20406	521025	12	<50	<5	5	5	70	<1	<5	30	<0.05	0.2	0.2
20407)	519025	15	<50	<5	10	5	70	<1	<5	40	0.05	0.2	0.3
20409)		15	<50	<5	5	10	70	<1	<5	30	0.05	0.7	0.3
20412)		3	<50	<5	10	15	50	<1	<5	20	0.2	2.0	0.2
20413)	50516	3	<50	<5	10	10	70	<1	<5	70	0.3	0.3	0.5
20414)		2	<50	<5	15	10	70	<1	<5	70	0.2	0.2	0.7
20415	506020	<2	<50	30	10	<5	70	<1	<5	70	0.1	0.1	0.5
20416	503017	<2	<50	10	10	10	70	<1	<5	50	0.1	0.3	0.5
20417	502017	<2	<50	<5	30	15	100	<1	<5	50	0.1	0.3	0.5
20419	469032	<2	<50	<5	20	15	70	<1	<5	50	0.1	0.2	0.5
20421	475025	<2	<50	<5	20	15	100	<1	<5	50	0.2	0.3	0.5
20422	480019	<2	<50	10	5	5	50	<1	<5	40	0.05	0.1	0.4
20425)	478025	<2	<50	<5	30	10	100	<1	<5	50	0.1	0.1	0.5
20426)		<2	<50	<5	20	10	100	<1	<5	40	0.1	0.3	0.3
20427	480025	<2	<50	<5	20	10	70	<1	<5	40	0.1	0.3	0.4
20428	482025	<2	<50	<5	20	15	70	<1	<5	40	0.1	0.3	0.4
20429	482026	<2	<50	<5	20	15	70	<1	<5	40	0.1	0.3	0.4
20430	478027	<2	<50	<5	40	20	100	<1	<5	40	0.1	1.0	0.4
20431	471029	<2	<50	<5	30	20	100	<1	<5	40	0.1	1.0	0.4

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20432	482031	<2	<50	<5	30	15	100	<1	<5	40	0.2	1.0	0.4
20433	472032	<2	<50	<5	10	15	70	<1	<5	40	0.1	0.5	0.3
20435	484035	<2	<50	<5	5	20	70	<1	<5	30	0.05	3.0	0.2
20436)	484034	<2	<50	<5	5	10	50	<1	<5	30	0.05	2.0	0.3
20437)		<2	<50	<5	5	10	70	<1	<5	30	0.05	3.0	0.3
20439	476021	<2	<50	<5	10	15	70	<1	<5	40	0.1	1.5	0.3
20440	484015	<2	<50	50	10	5	70	<1	<5	30	0.05	0.2	0.3
20442	489008	<2	<50	<5	10	5	70	<1	<5	50	0.1	0.4	0.4
20443	494001	<2	<50	<5	10	5	70	<1	<5	50	0.05	0.1	0.4
20444	492018	<2	<50	<5	10	15	70	<1	<5	50	0.1	0.5	0.4
20445	487016	<2	<50	<5	15	7	70	<1	<5	50	0.1	0.5	0.4
20446	518005	2	<50	<5	20	15	70	<1	<5	50	0.1	1.5	0.3
20447	518005	2	<50	<5	20	10	100	<1	<5	40	0.1	0.5	0.3
20448)	487016	2	<50	<5	20	5	70	<1	<5	50	0.1	0.5	0.4
20449)		<2	<50	<5	5	<5	80	<1	<5	40	0.05	0.5	0.3
20450	520002	2	<50	<5	15	25	70	<1	<5	30	0.2	2.5	0.3
20451	520002	2	<50	<5	10	15	70	<1	<5	30	0.1	2.5	0.2
20452)	488018	<2	<50	<5	15	10	70	<1	<5	70	0.1	0.1	0.4
20453)		<2	<50	<5	15	10	70	<1	<5	70	0.1	0.5	0.4
20454)		<2	<50	<5	15	10	50	<1	<5	50	0.1	0.3	0.4

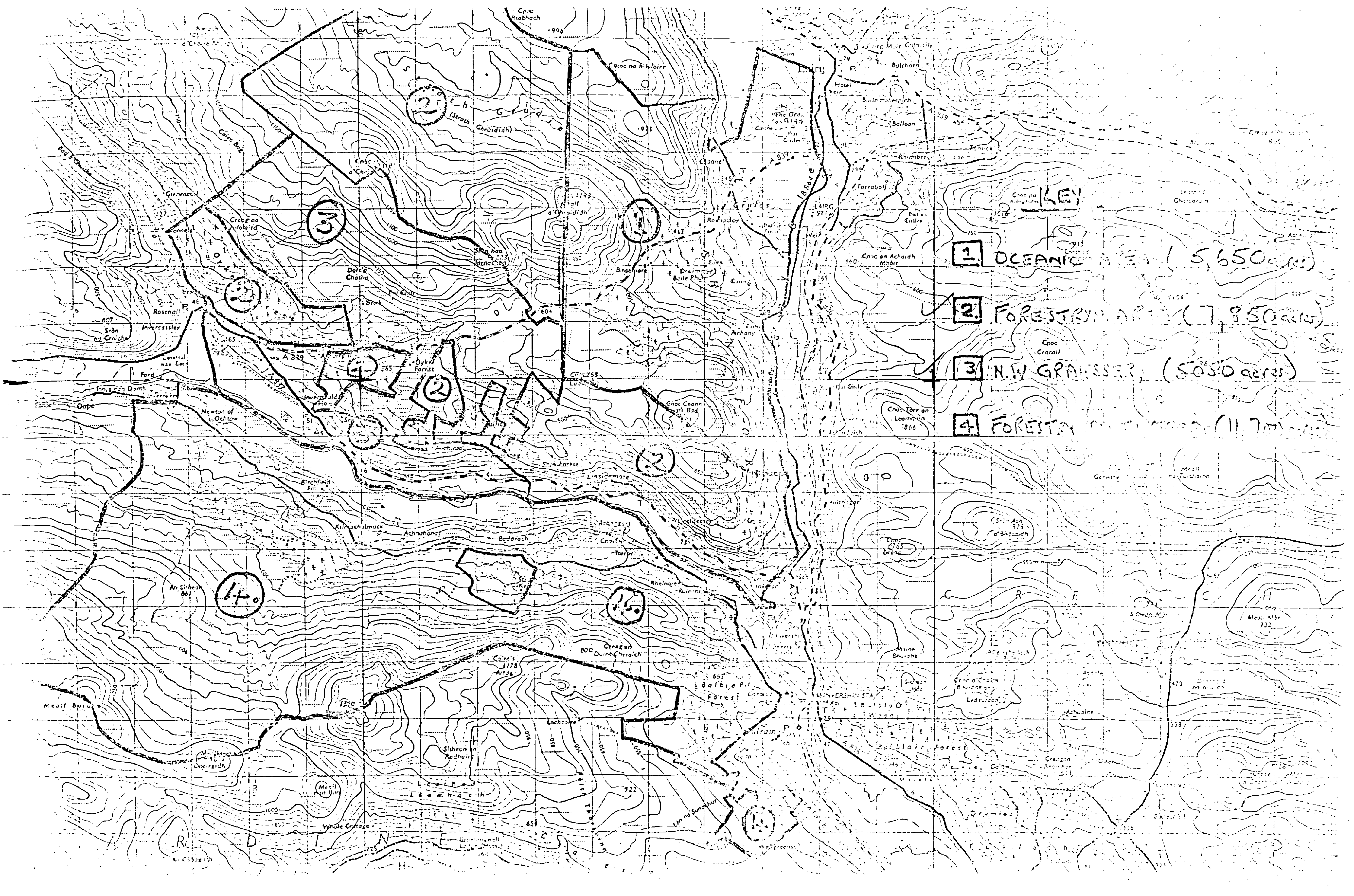
Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20455	520002	<2	<50	<5	15	15	50	<1	<5	30	0.2	3.0	0.2
20456)		2	<50	<5	40	25	70	<1	<5	50	0.3	2.0	0.4
20457)	522004	2	<50	<5	20	30	70	<1	<5	50	0.1	2.0	0.4
20458)		2	<50	<5	30	40	70	<1	<5	40	0.2	2.0	0.3
20459	575990	<2	<50	<5	40	15	70	<1	<5	40	0.05	0.2	0.4
20460	575988	<2	<50	<5	50	10	100	<1	<5	40	0.1	0.3	0.4
20463	554985	<2	<50	15	20	15	50	<1	<5	40	0.1	0.7	0.4
20465)		2	<50	<5	40	15	70	<1	<5	40	0.1	0.5	0.4
20466)	542993	<2	<50	<5	40	10	70	<1	<5	40	0.05	0.1	0.4
20467)		<2	<50	<5	40	10	70	<1	<5	40	0.05	0.2	0.4
20469	545996	2	<50	<5	40	10	70	<1	<5	50	0.1	0.7	0.5
20470	522998	2	<50	<5	30	15	70	<1	<5	50	0.1	0.5	0.4
20471	489007	<2	<50	<5	30	5	50	<1	<5	40	0.05	0.1	0.4
20475	481012	<2	<50	150	40	10	70	<1	<5	50	<0.05	0.2	0.5
20476)	478015	<2	<50	<5	20	15	50	<1	<5	40	0.05	0.2	0.4
20478)		<2	<50	<5	20	15	70	<1	<5	40	0.05	0.2	0.5
20479	473020	2	<50	<5	20	20	70	<1	<5	50	0.05	1.0	0.5
20483)		3	<50	<5	10	25	70	<1	<5	20	0.05	3.0	0.2
20484)	484046	<2	<50	<5	5	15	50	<1	<5	30	<0.05	2.5	0.2
20485)		<2	<50	5	10	10	50	<1	<5	30	0.05	2.5	0.3

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20486	488062	2	<50	<5	<5	15	50	<1	<5	<20	<0.05	0.5	<0.1
20487	489062	2	<50	<5	15	5	70	<1	<5	40	0.05	0.3	0.3
20636	529034	15	<50	<5	100	30	200	<1	<5	100	0.05	0.5	0.4
20639	529035	12	<50	<5	100	25	300	<1	<5	100	0.05	0.5	0.5
20641	514045	40	<50	<5	20	30	70	<1	<5	30	0.05	1.0	0.2
20643	516050	40	<50	<5	30	30	100	<1	<5	40	0.05	0.1	0.5
20644	520054	40	<50	<5	30	20	100	<1	<5	40	0.2	0.3	0.4
20646	477026	<2	<50	<5	30	20	100	<1	<5	40	>1	1.0	0.5
20648	477026	<2	<50	<5	30	20	100	<1	<5	40	0.2	0.7	0.5
*20649		<2	<50	<5	80	<5	>>1000	1	<5	50	<0.05	0.05	<0.1
*20650	CONTROL	5	<50	<5	20	7	200	35	<5	40	<0.05	0.2	0.2
*20652	SAMPLES	5	<50	<5	15	15	200	1	<5	30	<0.05	0.1	<0.1
*20653		1000	<50	<5	30	10	200	1	<5	50	<0.05	0.1	0.5
20654	495035	2	<50	<5	20	20	100	1	<5	50	0.05	0.7	0.4
20655)		2	<50	<5	5	10	70	<1	<5	30	0.1	2.0	0.3
20657)	496028	2	<50	<5	10	10	70	<1	<5	50	0.1	1.0	0.3
20658)		2	<50	<5	10	10	70	<1	<5	40	0.05	0.7	0.3
20659	501025	2	<50	<5	5	15	50	<1	<5	30	0.1	2.0	0.2
20660	490029	2	<50	10	30	15	100	<1	<5	50	0.1	1.5	0.4
20661	497027	2	<50	<5	15	15	100	<1	<5	40	0.1	1.0	0.4

*<u>NOTE</u>: Control samples are taken from outwith the Rosehall Area

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20663	499026	2	<50	<5	15	10	70	<1	<5	40	0.2	2.0	0.3
20664		2	<50	<5	5	5	70	<1	<5	20	0.1	2.0	0.2
20665	537051	15	<50	<5	20	15	100	<1	<5	50	0.1	1.0	0.4
20668	533053	2	<50	<5	5	5	50	<1	<5	30	<0.05	0.3	0.3
20669		3	<50	<5	30	25	200	<1	<5	50	<0.05	1.0	0.3
20670	534054	10	<50	<5	30	10	100	<1	<5	30	0.05	1.5	0.2
20673	528062	5	<50	<5	10	15	100	<1	<5	40	0.1	0.7	0.2
20675	527064	7	<50	<5	10	10	100	<1	<5	50	0.05	0.5	0.2
20677	524066	3	<50	<5	30	15	100	<1	<5	70	0.1	0.3	0.4
20678		2	<50	<5	10	10	50	<1	<5	30	0.05	1.0	0.2
20679	523066	3	<50	<5	10	10	100	<1	<5	50	0.1	0.2	0.3
20681	502069	<2	<50	<5	5	10	70	<1	<5	40	0.05	0.1	0.3
20682	502068	<2	<50	<5	5	<5	50	<1	<5	40	0.1	0.05	0.4
20685	493061	4	<50	<5	30	30	70	<1	<5	50	0.1	1.0	0.4
20686	493058	2	<50	<5	10	15	70	<1	<5	50	0.05	0.5	0.3
20687		2	<50	<5	10	10	70	<1	<5	40	0.05	0.4	0.3
20689	492058	2	<50	<5	10	10	70	<1	<5	40	0.05	0.5	0.3
20690	491039	2	<50	5	5	<5	70	<1	<5	40	0.05	0.1	0.2
20691	493045	2	<50	5	5	15	70	<1	<5	50	0.05	0.4	0.2
20692		2	<50	<5	10	10	70	<1	<5	50	0.05	0.3	0.2

Sample	Grid Reference	Mo ppm	W ppm	Sn ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Bi ppm	V ppm	Ba %	Mn %	Ti %
20693	493045	2	<50	<5	10	10	50	<1	<5	40	0.1	0.7	0.2
20694	493041	2	<50	<5	5	15	70	<1	<5	30	0.05	0.7	0.2
20695	496039	2	<50	<5	20	15	70	<1	<5	30	0.1	0.7	0.2
20696	498038	2	<50	<5	5	15	70	<1	<5	40	0.1	1.0	0.2
20698)		3	<50	<5	20	10	50	<1	<5	40	0.1	2.5	0.2
20699)	495035	2	<50	<5	5	10	50	<1	<5	30	0.1	1.5	0.2
20700)		3	<50	<5	10	20	70	<1	<5	30	0.1	3.0	0.2


KEY
1. OCEANIC
2. FORESTRY
3. N.W
4. FORESTRY
Lairg
Rosehall
Invercassley
Oykel Forest
Strath Ghruidh
Achany
Newton of Ochtow
Birchfield
Kilmachalmack
Achnahanat
Balblair Forest
Invershin Sta

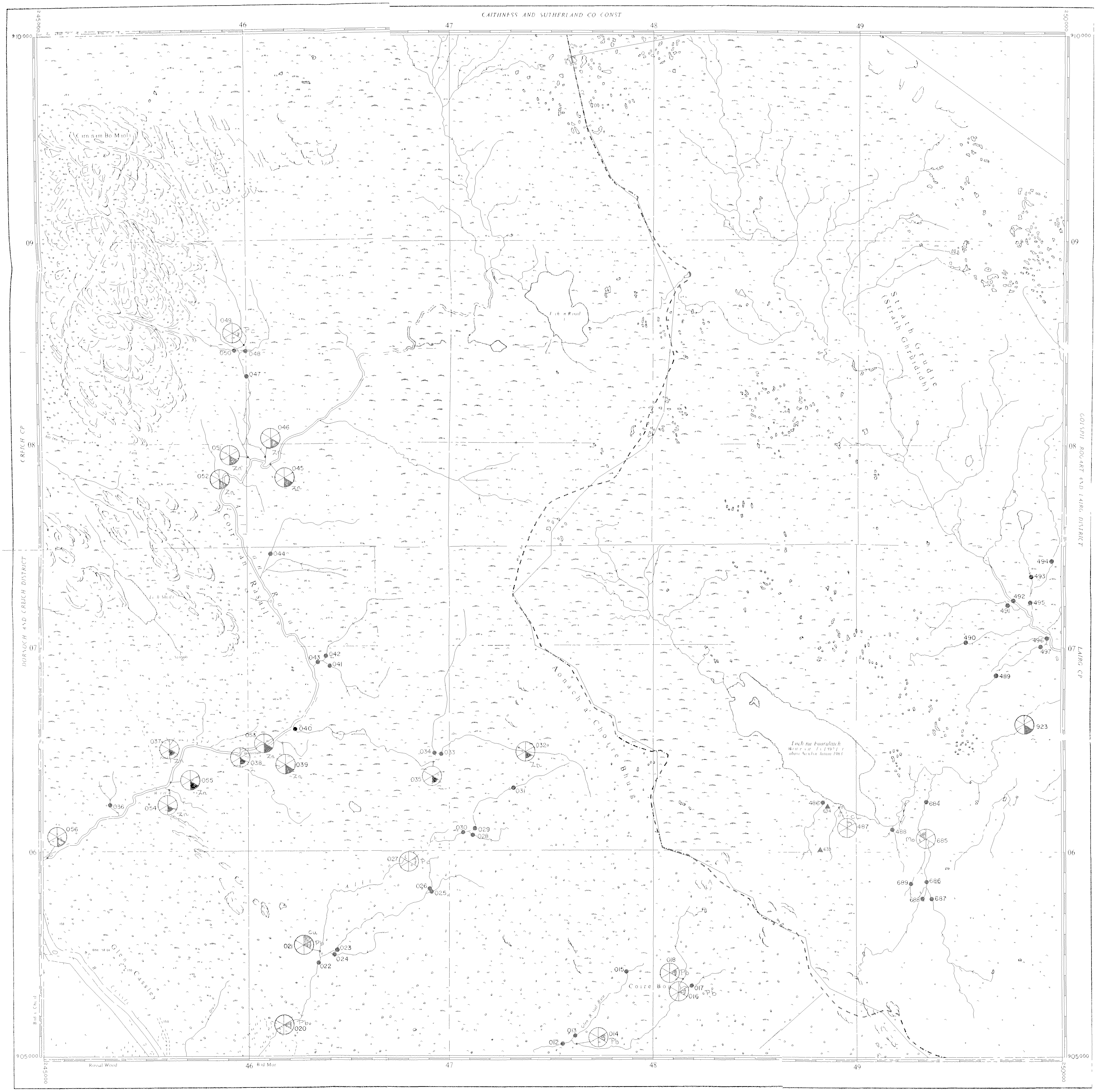
GEOLOGICAL BOUNDARIES AND LOCALITIES SHOWING GEOPHYSICAL TRAVERSE LINES

LEGEND

Granite .... (g) Basic schist .... (b) Fault ....

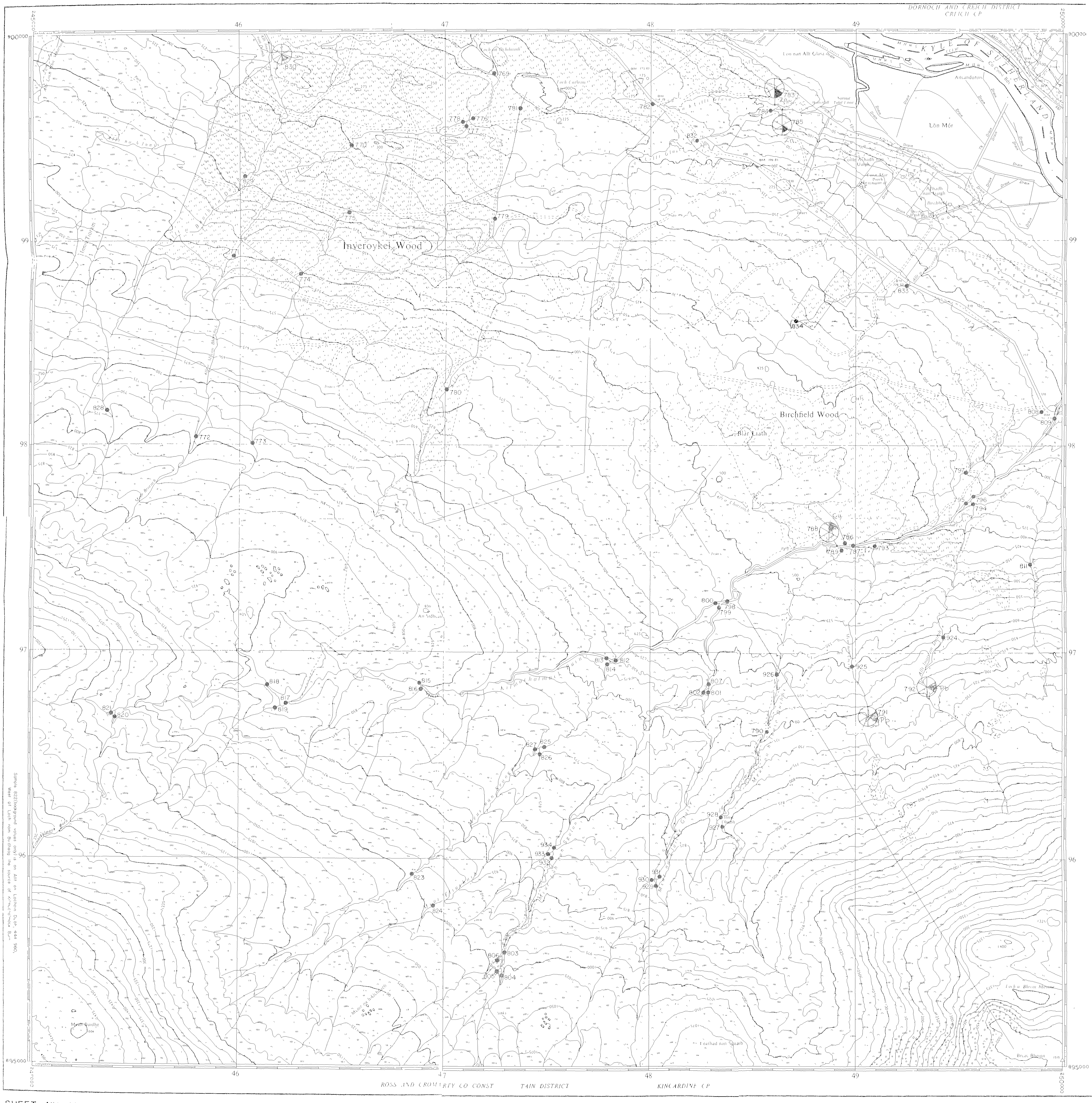
Geological locality .... CO Line of geophysical traverse (1) ....

FIGURE 2



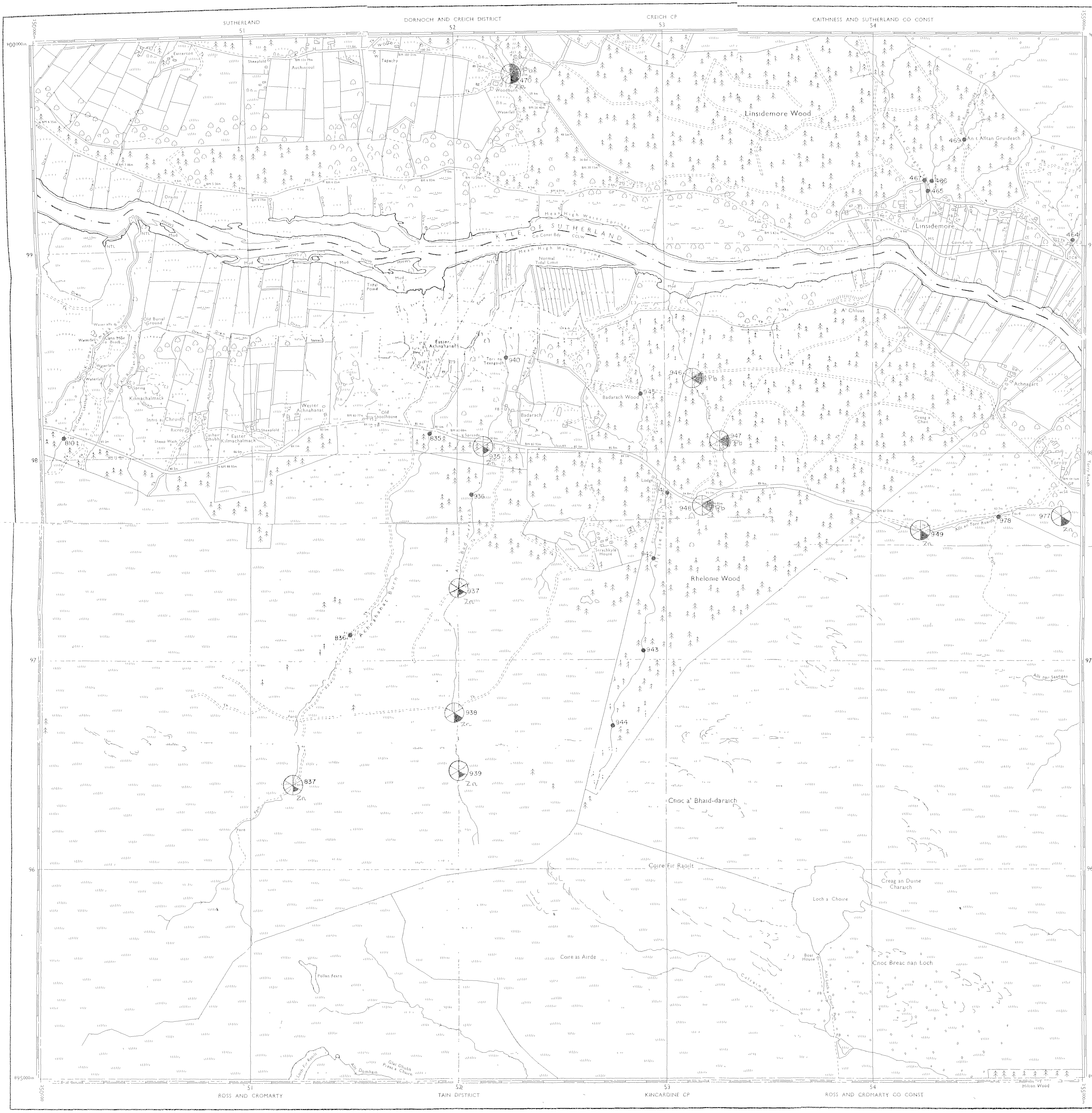
SHEET NC 40 NE

ENCLOSURE 4



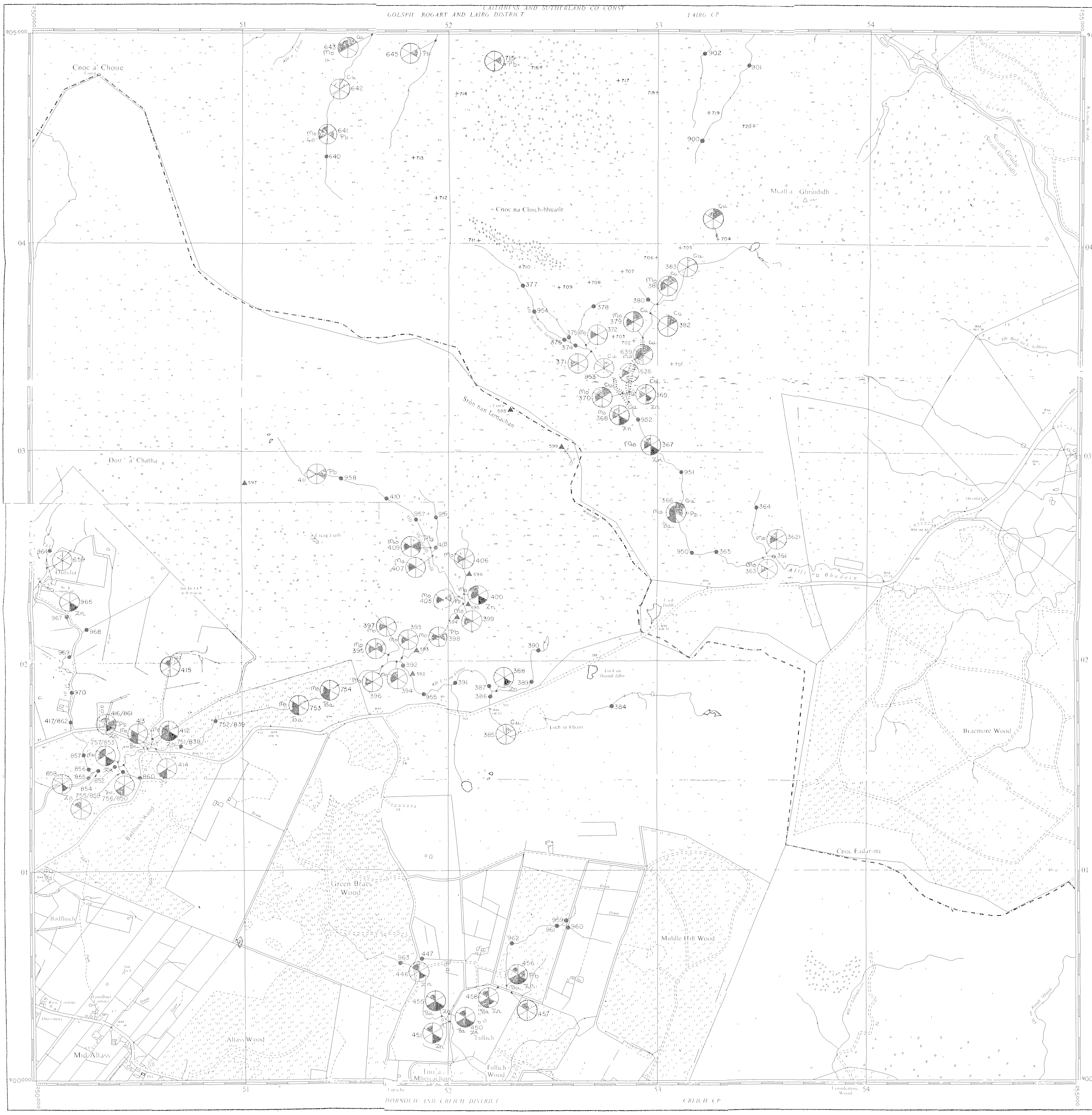
SHEET NH 49 NE

ENCLOSURE 8



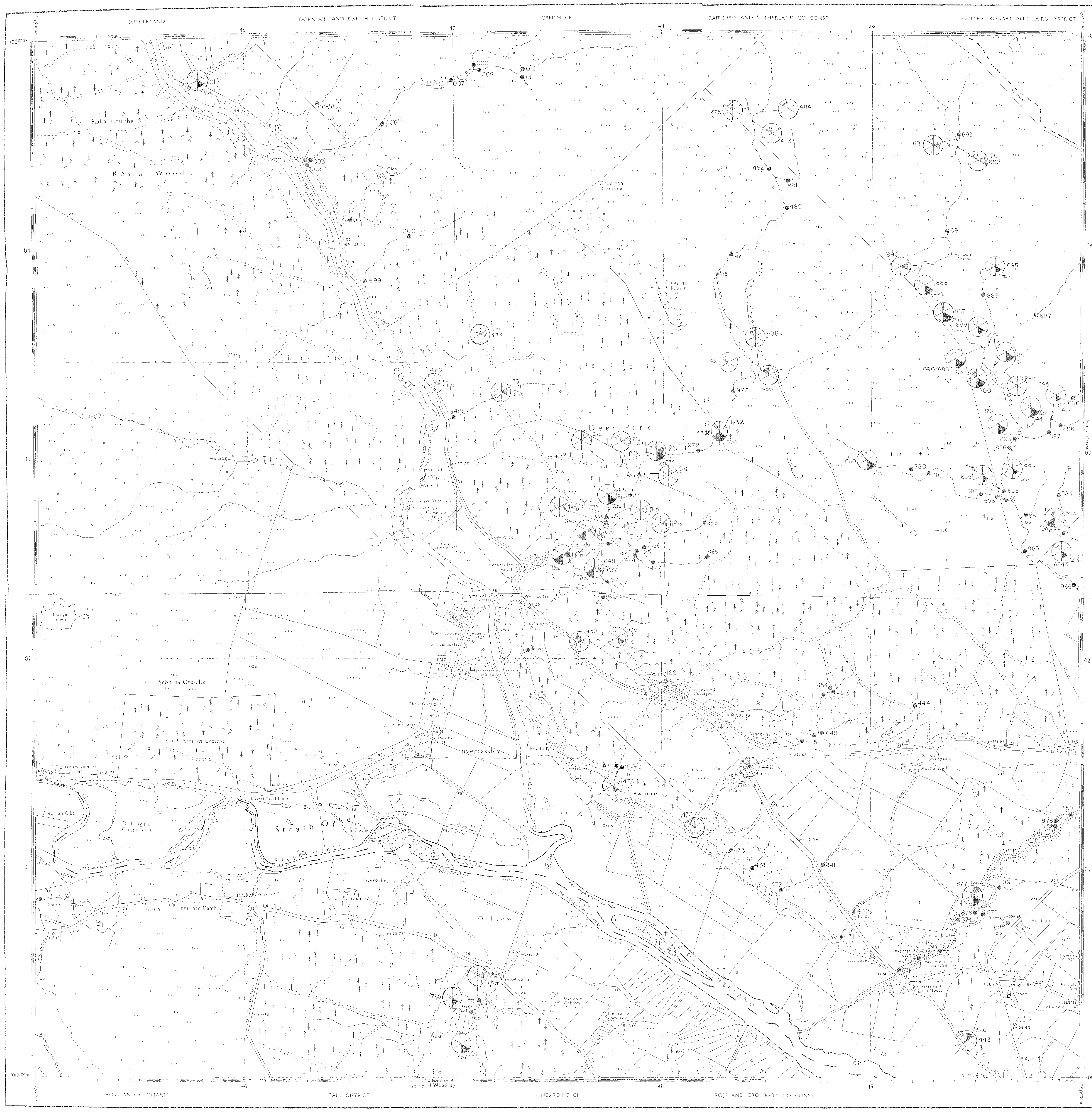
SHEET NH 59 NW

ENCLOSURE 9



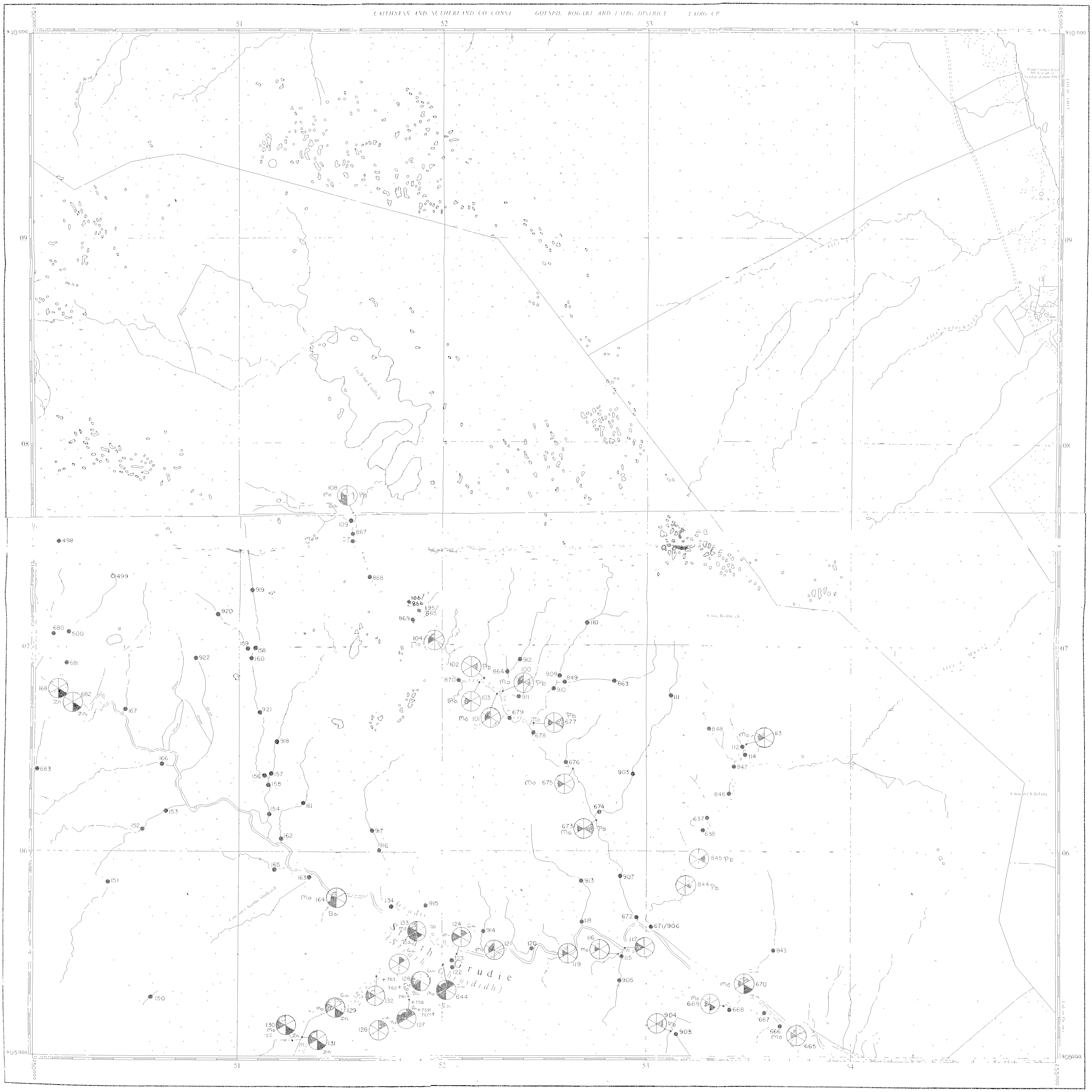
SHEET NC 50 SW

ENCLOSURE 7



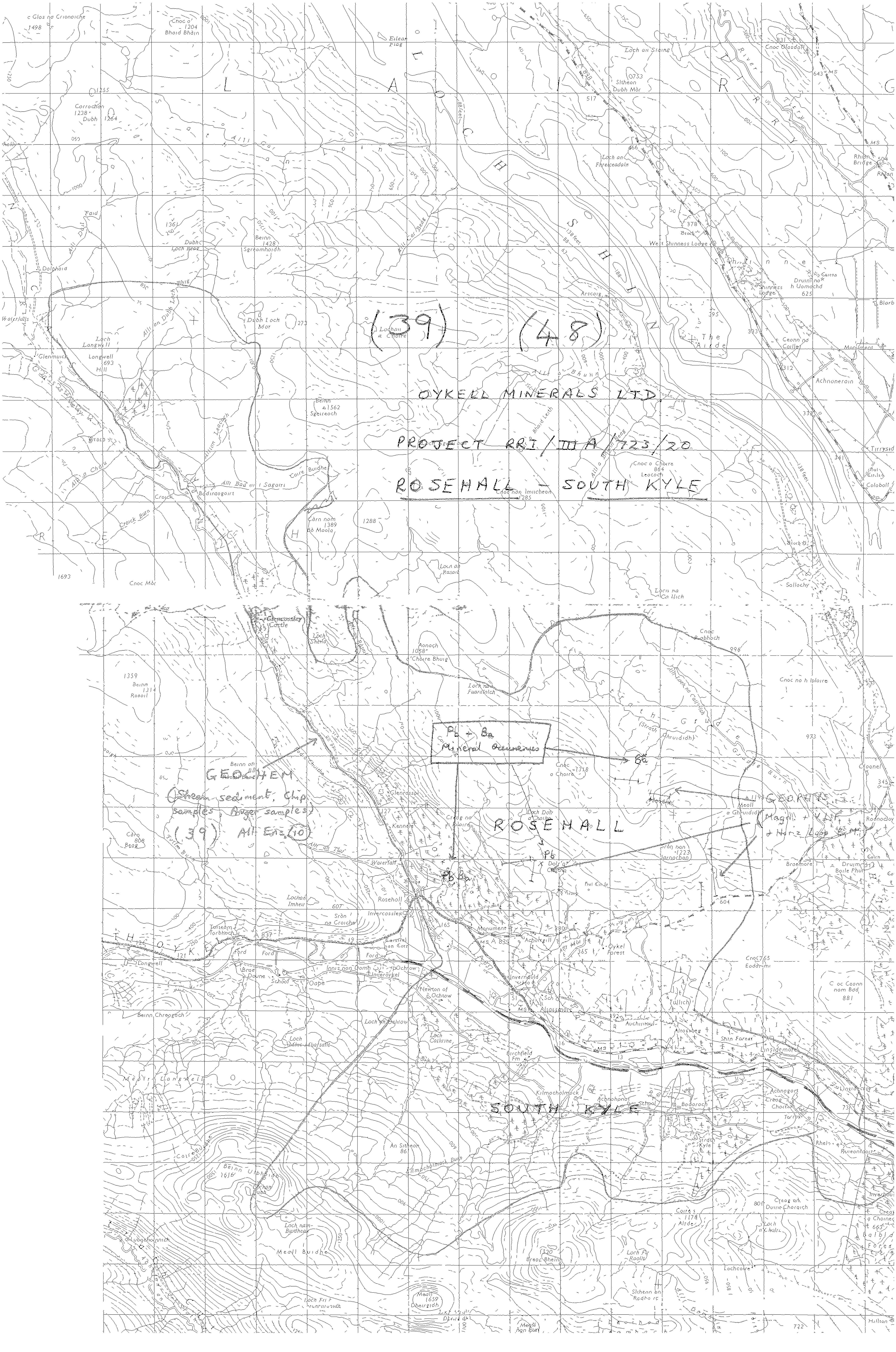
SHEET NC 40 SE

ENCLOSURE 6

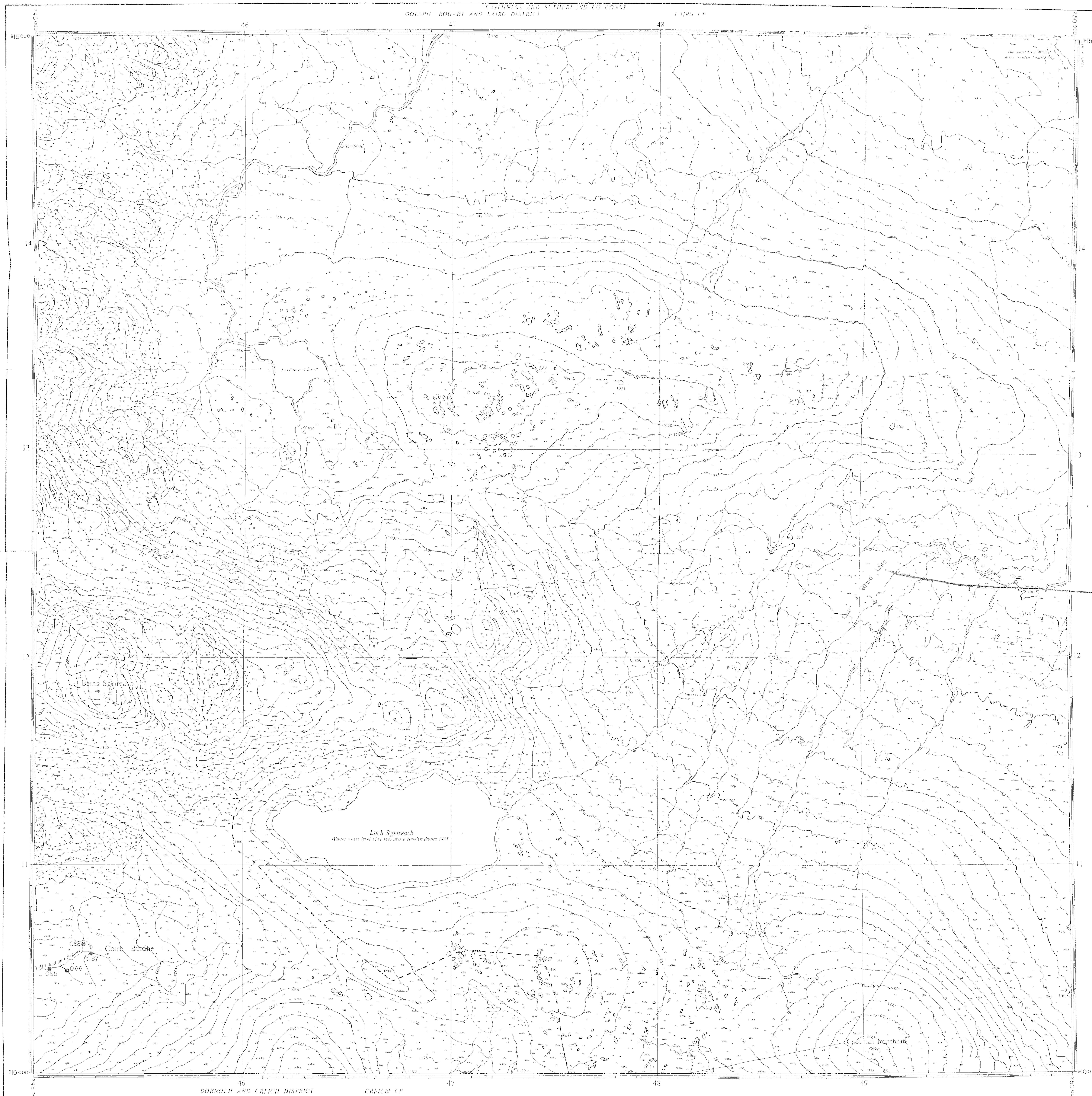


SHEET NC 50 NW

ENCLOSURE 5

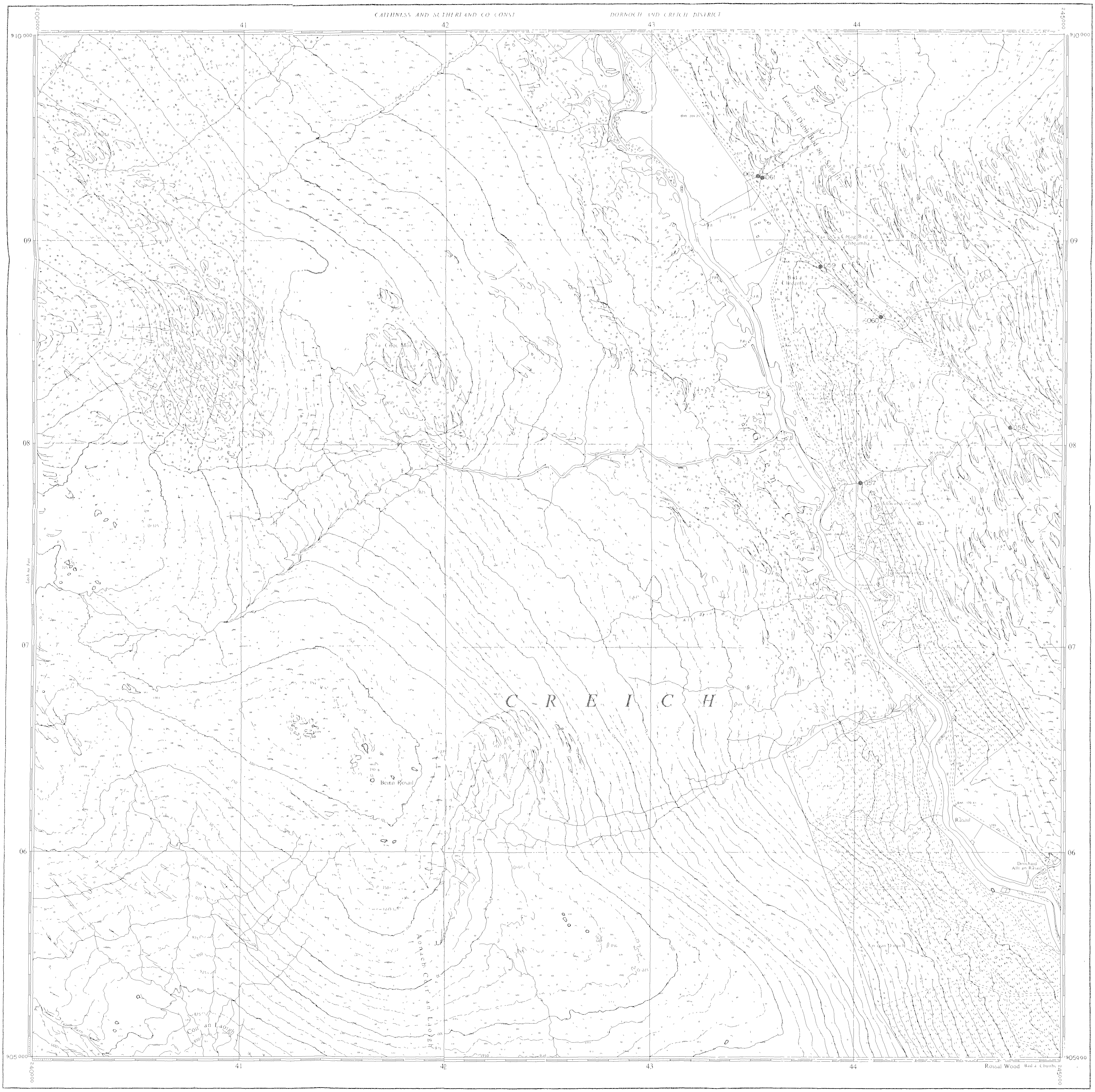


(39) (48)
OYKELL MINERALS LTD.
PROJECT RRI/III A/723/20
ROSEHALL - SOUTH KYLE
Pb + Ba Mineral Occurrences
Ba
GEOCHEM
(Stream sediment, Chip samples Auger samples)
(39) All Ex. (10)
ROSEHALL
Pb
Pb Ba
SOUTH KYLE



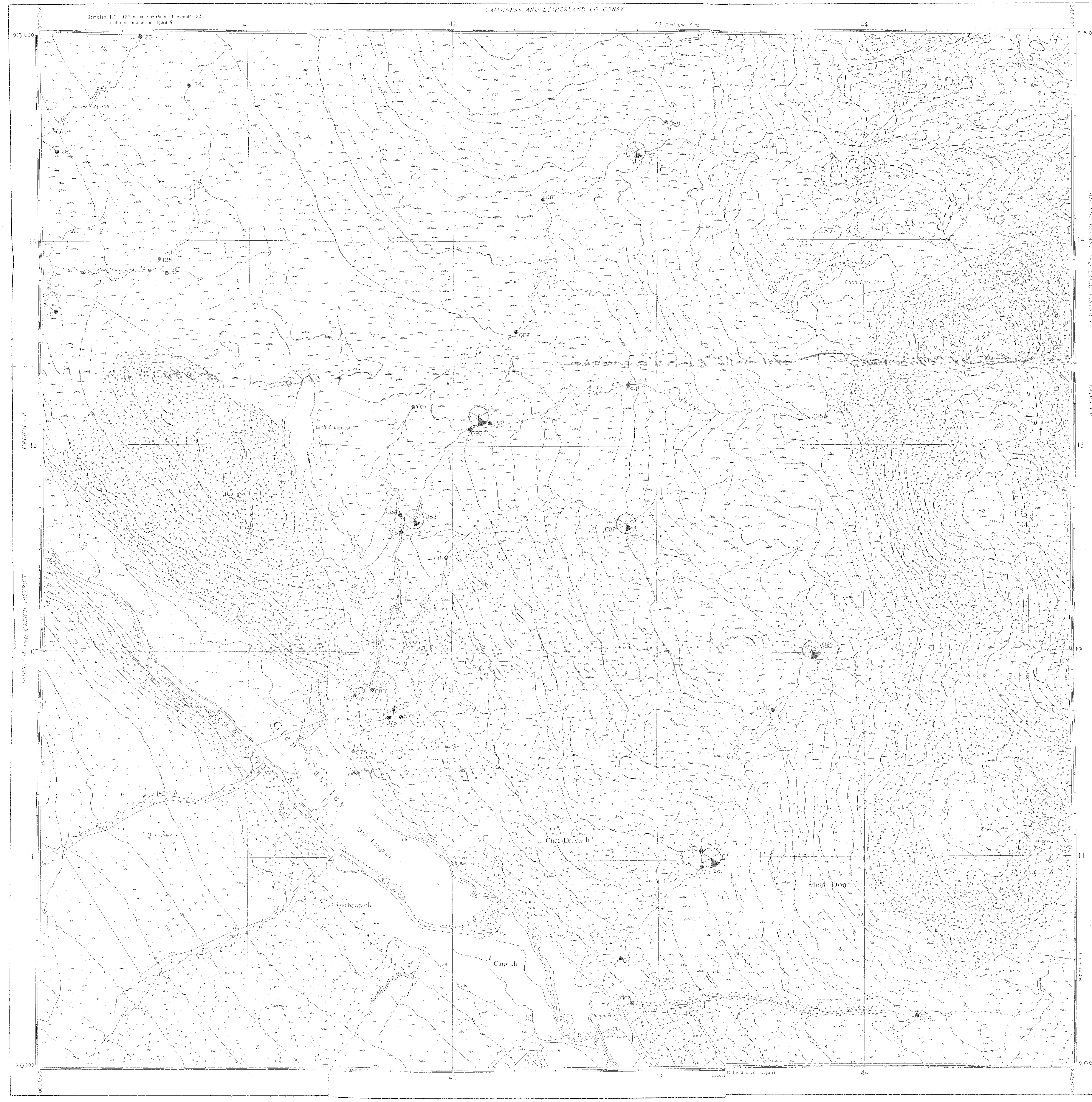
SHEET NC 41 SE

ENCLOSURE 2



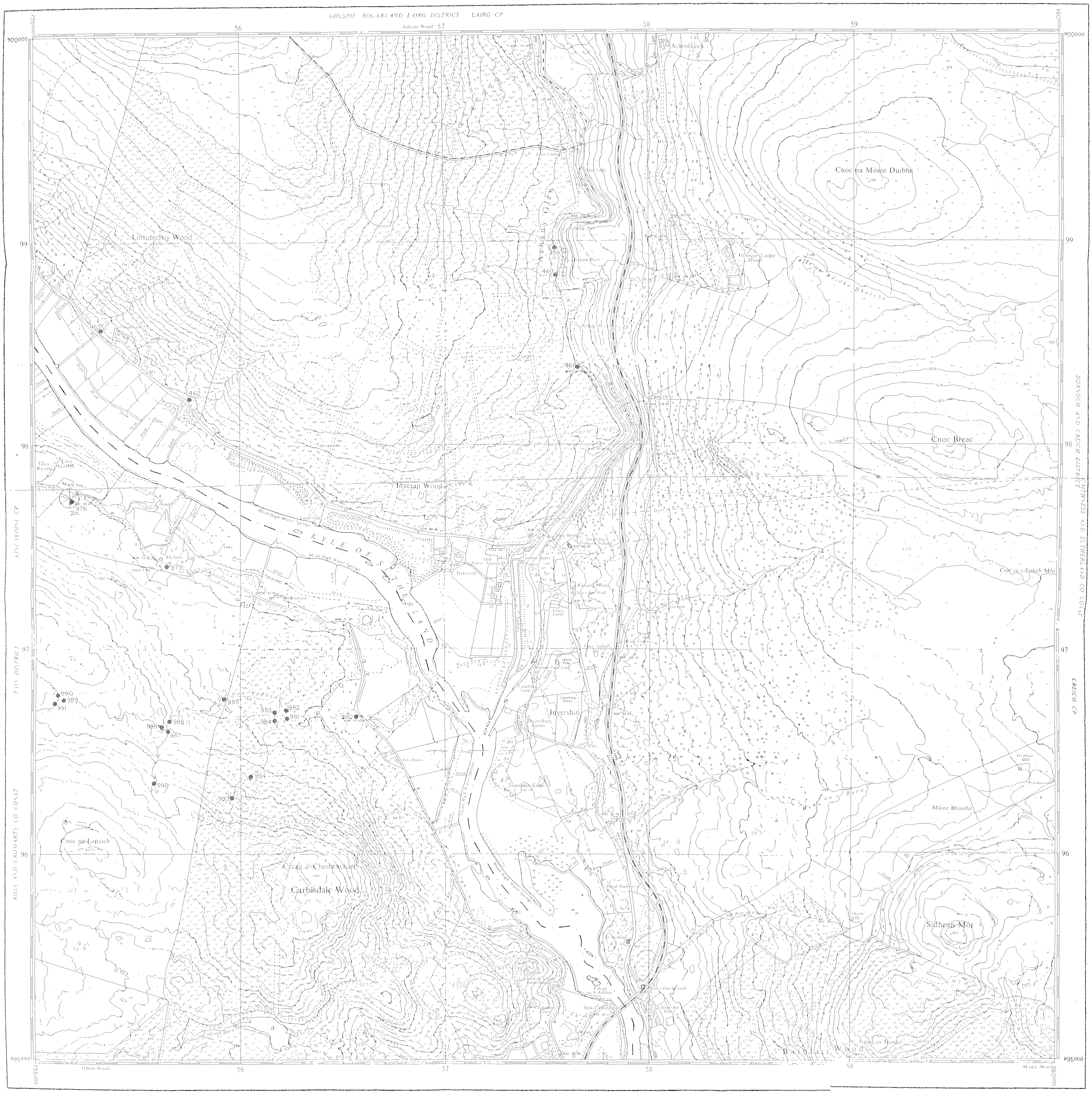
SHEET NC 40 NW

ENCLOSURE 3



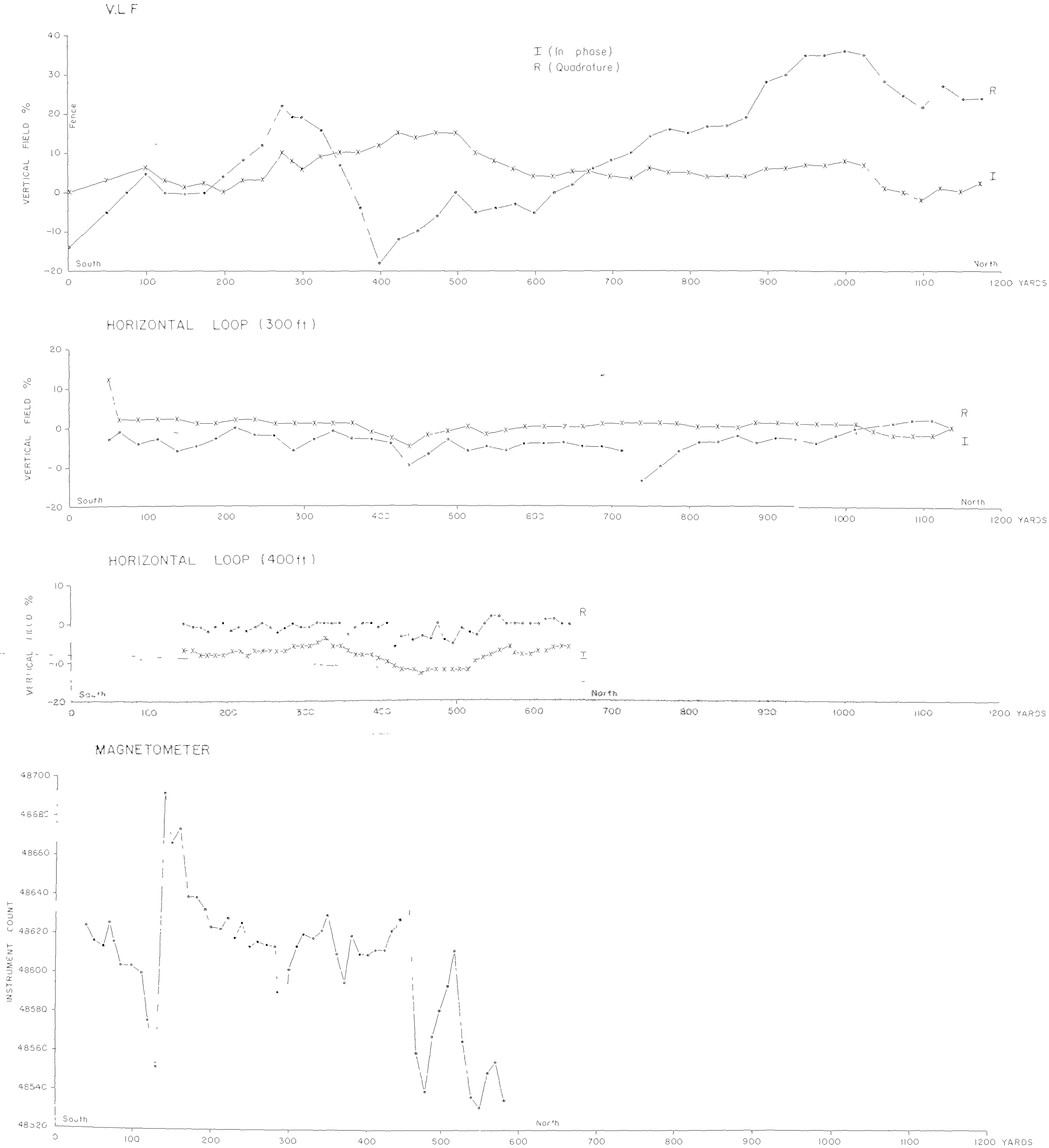
SHEET NC 41 SW

ENCLOSURE 1



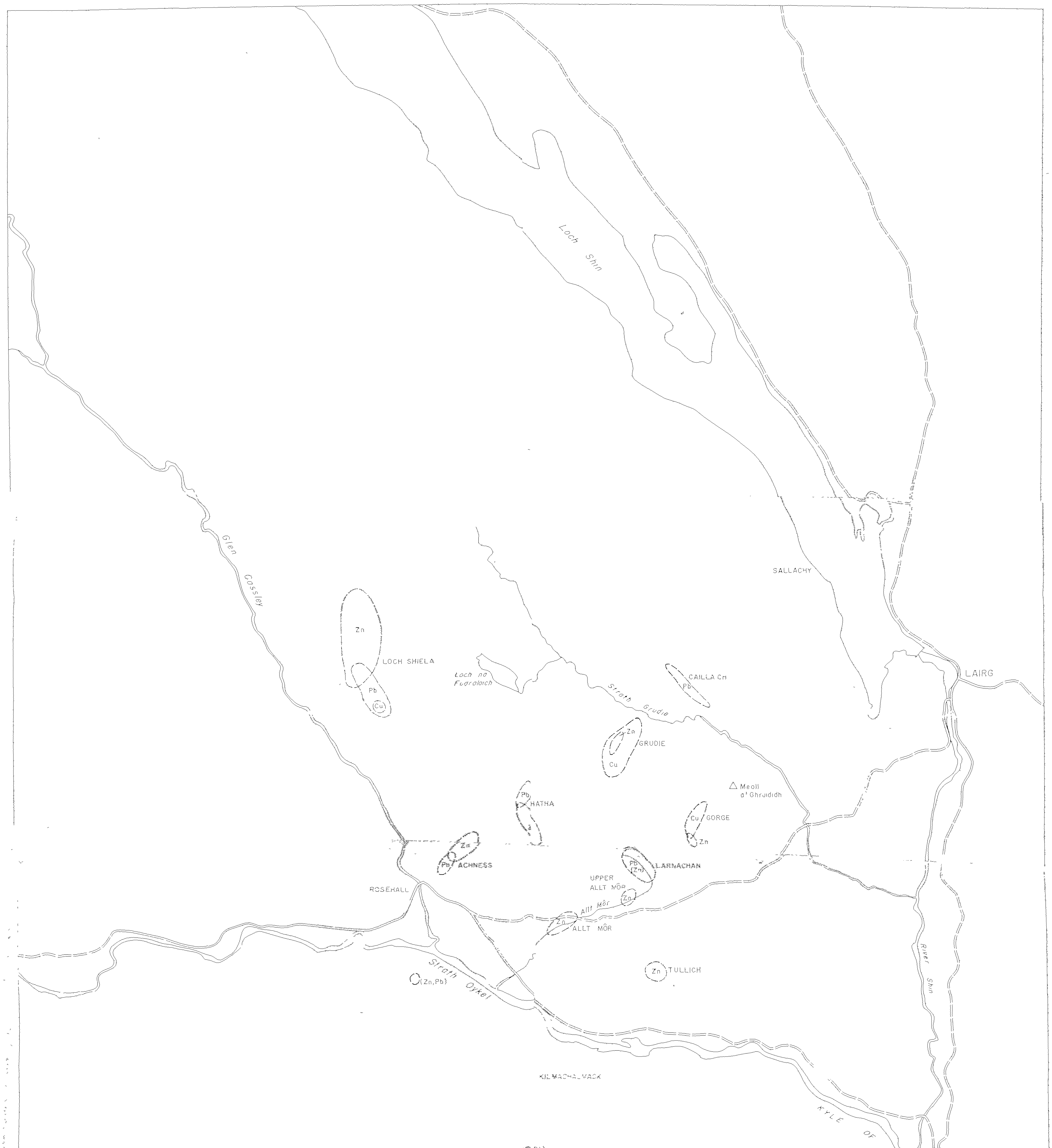
SHEET NH 59 NE

ENCLOSURE 10



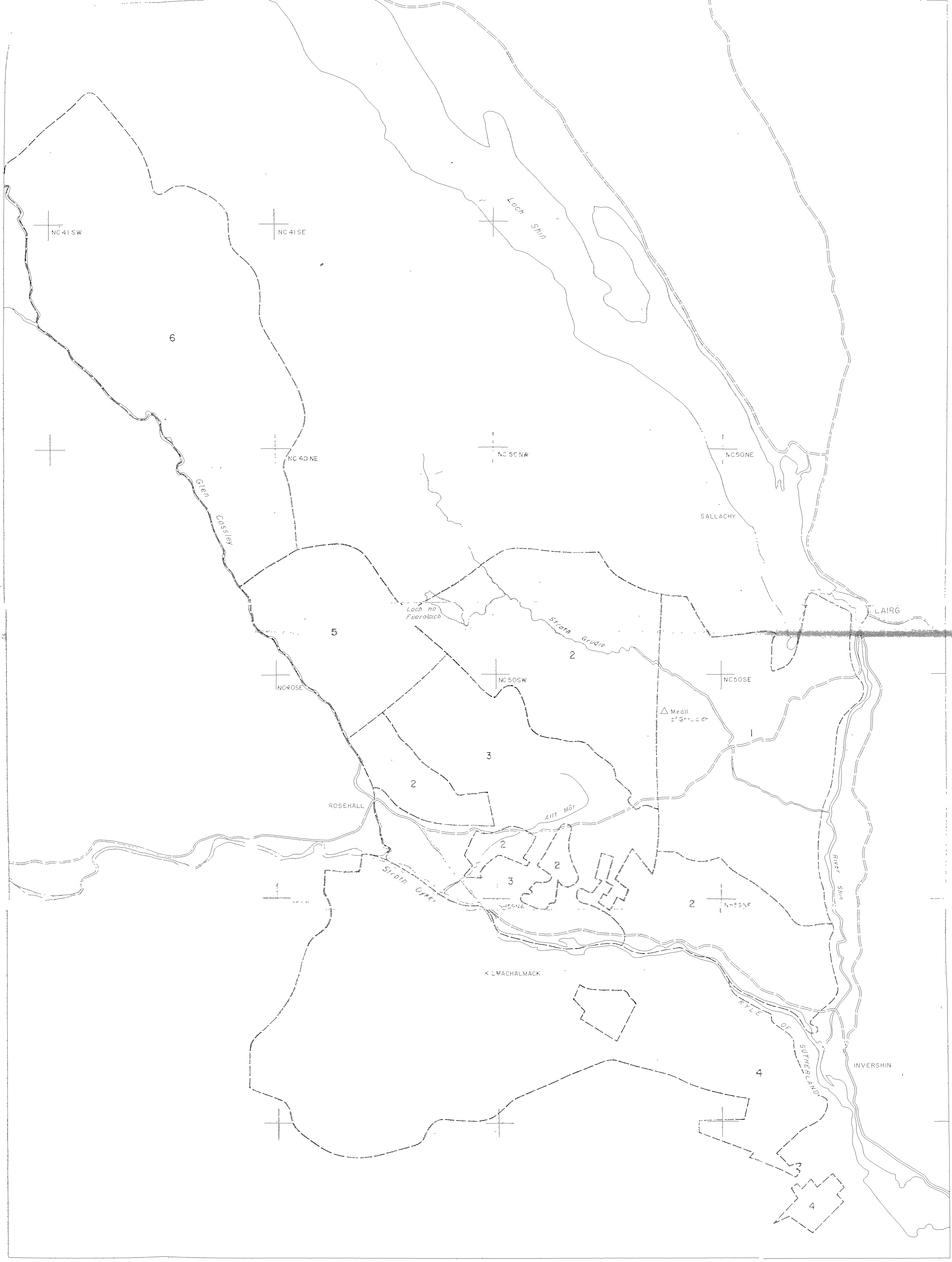
GEOPHYSICAL PROFILES ALONG TRAVERSE I

FIGURE 6



SUMMARY OF MAJOR GEOCHEMICAL ANOMALY GROUPINGS IN Cu, Pb, AND Zn

FIGURE 5



APPROXIMATE BOUNDARIES OF THE SURVEY AREAS AND KEY TO 6" SHEET NUMBERS

L E G E N D

Oceanic area 1   Forestry Commission area, north .. 2   N.W. Groesser, Rosehall 3

Forestry Commission area, south .. 4   Glenrossal Estate 5   Glencassley Estate 6

FIGURE 1

ROSEHALL GEOCHEMICAL SURVEY

SCALE 1 : 10,000

METRES 200 0 200 400 600 800 1000 METRES

YARDS 200 0 200 400 600 800 1000 YARDS

TOPOGRAPHICAL LEGEND

ROADS

Road

Tk Track — Where unfenced shown by pecked lines

Path Path

RAILWAYS

Standard gauge
- Multiple track — Embankment, Cutting
- Single track — Road over, Level crossing, Road under, Foot bridge
- Siding, tramway or mineral line

Narrow gauge

VEGETATION

Bracken	Marsh	Scrub
Rough grassland	Saltings	Coppice
Heath	Reeds	Orchard
Coniferous trees	Non-coniferous trees	

MISCELLANEOUS

Antiquity (Site of)	Dunes	Chalk pit, clay pit or quarry
Building	Glasshouse	Gravel pit
Boulders	Refuse or slag heap	Sand pit
Electricity transmission line — Pylon, Pole	Lake, loch or pond	Disused pit or quarry
	Sloping masonry	Triangulation point

Direction of flow of water — Shingle, Sand

BOUNDARIES

The first appropriate symbol in this list is shown when coincidence of boundaries occurs:
- Geographical County
- Administrative County, County Borough or County of City
- Municipal Borough, Urban or Rural District, Burgh or District Council

Shown alternately with one of the symbols above when coincidence of boundaries occurs: Civil Parish showing change of mereing (FP, CP)

Shown only when not coincidental with other boundaries: Borough, Burgh or County Constituency

ABBREVIATIONS

Boundary Post or stone	BP, BS	Police Station	Pol Sta	Telephone call box	TCB
Church	Ch	Post Office	PO	Telephone call post	TCP
Club House	CH	Public Convenience	PC	Guide post	GP
Fire Engine Station	FE Sta	Public house	PH	Mile post	MP
Foot bridge	FB	Signal box	SB	Mile stone	MS
Fountain	Fn	Spring	Spr	Well	W

HEIGHTS

Values are given in feet above mean sea level at Newlyn

Surface heights determined by ground survey 21

Bench mark and value .... BM 369 02

ROCK FEATURES

Vertical face

Loose rock, Boulders, Outcrop, Scree

STREAM SEDIMENT SAMPLES

PROBABLY ANOMALOUS VALUES (WITH SAMPLE NUMBERS)

Others, Copper Cu, Lead Pb, Zinc Zn, Barium Ba, Molybdenum Mo — 450

POSSIBLY ANOMALOUS VALUES (WITH SAMPLE NUMBERS)

Others, Copper, Lead, Zinc, Barium, Molybdenum — 366

BACKGROUND VALUES ONLY

● 361

Uncoloured segments also indicate background values

OTHER METALS

Anomalies for Manganese, Chromium, Nickel, Cobalt, Tin and Silver are detailed in the text

ROCK CHIP SAMPLES ▲720

(No anomalous values)

SHALLOW AUGER SAMPLES +596

(No anomalous values)

SHEET INDEX

NC31NE	NC41NW	NC41NE
NC31SE	NC41SW	NC41SE
NC30NE	NC40NW	NC40NE

Prepared for

OYKEL MINERALS LIMITED

Macfarlanes, Dowgate Hill House, London EC4R 2SY and GPO, Box 4817, Sydney, N.S.W. 2001 Australia

ROBERTSO

Ty'n-y-Coed, Llanrhos, Llandudno

COMPILATION NOTE

Based upon Ordnance Survey sheet NC41SW at 1:10,000 scale with the sanction of the Controller of H M Stationery Office

Drawing No. 1762

Date 23.5.7.