RELINQUISHMENT REPORT

ON AREAS RELEASED FROM

EXPLORATION LICENCE 4/61

WEST COAST, TASMANIA

Edited by
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INTRODUCTION

Pursuant to Department of Mines guidelines the area of Exploration Licence 4/61 (EL 4/61) will be reduced from 383 km^2 to 125 km^2 on 23 February 1985. Department of Mines guidelines further provide for the preparation and submission to the Department of a final report on the relinquished area containing a summary of all exploration work plus any data not previously reported.

This report comprises any material relevant to the relinquished area in IMI field season reports between 1980 and 1984 linked with any available and relevant primary data available from 1985 and bridging material. Any relevant primary 1985 data which becomes available subsequent to the compilation of this relinquishment report will be forwarded to the Department when it becomes available.

The report divides the area relinquished into five major blocks. Primary interpretative and bridging material has been compiled for each block area.

The areas of the Pieman Scenic Reserve, H.E.C. Lower Pieman Area, Savage River Mines Leases and Savage River Townsite Lease have been effectively excluded from EL 4/61 for years although not recorded as such on EL maps.

In addition to this data two small sediment projects conducted more than five years ago are relevant to the released areas and are classed as open file material: Stringer Creek area (1978) in the Lucy Creek Block and Harvey Creek Little Savage River (1979) in the Badger Plain Block. These reports would be available at the Department of Mines.

Geochemical data is assembled into tables and plans relevant to each block.

PART 1 (A)

BADGER PLAINS BLOCK (NORTH)

Little Donaldson River Area

(Extract from "Report on Field Investigations within EL 4/61, West Coast, Tasmania: Summer Field Season 1981-82, Part 1: Geochemical Programme Northern EL 4/61")

1. LOCATION AND ACCESS

The area is centred 10 km north of Savage River township. It is covered by the Horton 1:50,000 and Arthur River 1:100,000 map sheets.

From Savage River, the pipeline road is the only practicable approach. An access track was constructed leaving the pipeline road at 524145 and extending roughly WSW to 460098. It crosses the cut baseline for the geochemical sampling grid at 490122 and at this point a short branch track leads to the prepared camp area at 487126 which is centrally located to the 8 km long baseline. Traverse lines branching from the baseline are aligned along grid E-W and spaced generally 500 m apart. The lines along 110N and 150N are extended to the pipeline road and provide an alternative though strenuous walking track access.

The access track incorporates most of the track work of the previous field season, exceptions being a major diversion needed to reduce grade 2 km in. An attempt to avoid another steep pinch at 4 km had to be abandoned owing to landslips.

The natural surface of the road must be classed as poor over extensive tracts of the Permian tillite/mudstone and Precambrian greenschist country and also in sections of the Tertiary basalt terrain. To illustrate the point, a section on Permian tillite at 3 km needed to be rebuilt twice during the field season and ultimately was surfaced with corduroy. On sections of greenschist and basalt, traction was lost after a light shower even in summer, and the section on basalt beyond the camp was effectively abandoned in March.

A partial solution to the problem was to equip all vehicles using the road with chains. By the end of the season the road itself had firmed considerable. The use of chains was effecting damage at some critical points.

The weak point most likely to close the road is at a critical hairpin bend 2 km in. At this point there is a spring induced by the basalt/Permian contact which has generated a succession of mudflows. At the end of the season the most recent mudflow had already nearly closed the road.

Cut lines were established by first flagging carefully located compass traverses through the bush, which were then converted to tracks by contract line cutters (the Purton brothers). This method enabled tracks to be accurately located in relation to the Australian Map Grid.

2. RELIEF AND DRAINAGE (GEOMORPHOLOGY)

The area is a dissected benched plateau with the principal surface represented by the frequency of 400 m summit ring contours. In adjacent country there are indications of other bench levels indicated by 460 m, 500 m and 320 m summit ring contour maxima. The 460 m surface is well represented on the basalt plateau in the first 2 km of the access track. The bench relicts are up to 2 km across making quite extensive tracts of gentle tops country, which narrow down to ridges that still usually maintain accordance though at a lower level. Slopes leading off to the valley side benches are uncommon, so there is normally one continuous steep slope from plateau edge to valley floor. (This situation effectively prevented construction of a track to the Little Donaldson River.) Relative relief is of the order of 150 m.

The major river of the area is the Little Donaldson River which is, paradoxically, roughly double the width of the Donaldson River and may carry perhaps four times the volume of water. Within the area the Little Donaldson is a mature stream generally flanked with alluvial flats and with only short sections of bedrock floored rapids. The fall from the EL boundary at 510167 to the "hairpin" at 462115 is about 30 m, (270 m to 240 m), thus lacking anything to suggest a knickpoint in the area.

This level in the river channel may correspond to the mature reaches of the (other) Donaldson River and Broderick Creek, and the plateau-level western tributaries of McAuliffe Creek which are all around 300 m. The presence of a major knickpoint is indicated by the contrast in mature levels of Broderick Creek and McAuliffe Creek where they run parallel to each other with McAuliffe Creek incised 100 m lower.

All the rivers drain ultimately to the Pieman; the access track corresponds to the divide between the Donaldson and the Savage. The parallel courses of the Donaldson and Little Donaldson Rivers, which transgress the grain of the Precambrian, are thought to be twin-laterals inherited from a basalt cover.

3. VEGETATION

Nearly all the area is covered by temperate rainforest with the antarctic beech species Nothofagus cunninghamii being the dominant tree species supplemented by sassafras, leatherwood and horizontal, and ground cover of mosses, ferns and man ferns. Large crowned forest is the most common variety; the healthiest looking and most open forms are found on the basalt covered plateau relicts, although the greenschist terrain and parts of the Permian contain trees of comparable size. Areas with horizontal thicket are scattered throughout with notable concentrations in gullies and scarp edges.
Less common is a stunted variety in which big Bauera tends to replace the sassafras and leatherwood, and there is often also some celery-top pine. It tends to indicate quartz gravel soils and sometimes peat.

A very distinct minor vegetation type is paperbark with Bauera or rush understorey. It can occur as an isolated pocket or as a rim around a button grass area.

Eucalypt species were found only around the edge of "button grass" areas, and in a rare fern ground cover-Nothofagus-eucalypt forest. The eucalyptus "button grass" areas encountered were all degenerating to ti-tree or Bauera (presumably because of exclusion of fire since the passing of the aborigines).

An incidental discovery of the soil sampling programme was the presence of charcoal and brick-red calcined earth in many of the auger holes. As the larger trees throughout the area are more than a metre in diameter, the fire responsible would have to pre-date European contact in Tasmania. The larger trees appear to be even-aged and presumably grew up in regeneration after the fire.

A different form of stunted forest occurs in the west of the area where the track ends. Apart from the addition of more celery-top pine species, composition is close to that of the mature beech forest. It seems to be controlled by a lower soil fertility and/or a more recent severe fire.

None of the vegetation was easily traversed except for odd clear patches in the mature beech forest. In practice, cut access tracks were needed for any job which required gear such as augers, etc., to be carried in to a locatable point.

4. GEOLOGY - INTRODUCTION

The Precambrian basement of the area could be divided into an eastern area where greenschist was the dominant lithology and a western area which was mainly grey slate.

The greenschist area was divided by a N-S area of Permian rocks, mainly glacials, and the area examined lies within the official mapped boundary of the Arthur Lineament but does not iclude any rocks of the "psammitic association of the Whyte Schist" (Urquhart, 1966). Bedding and schistocity attitudes are normally steep and dip westwards. It is thought that the area is a simple west-dipping sequence. (*Ed: This concept is no longer held.)

5. STRATIGRAPHY

5.1 Quaternary - Introduction

Although something of a nuisance factor, an understanding of the nature and extent of the Quaternary superficial deposits is important in understanding and assessing relevance of a soil sampling programme, such as was undertaken in this field programme. Such cover is general and can be assumed to be present wherever actual rock outcrop is not present.

5.1.1 Alluvium

Alluvial cover is usually present alongside any stretch of creek or river which has attained an approximate base grade. Normally only a single flat level is present and this is subject to contemporary flooding. Traces of older and higher terraces were found. The presence of rock bars indicates that deposits are only 4 metres or so thick. Valley alluvium along even the largest river is normally less than 100 m wide but does reach 500 m in places along the Little Donaldson River.

5.1.2 Transported soil

Evidence for a near universal transported soil mantle was discovered in the auger drilling, where the most common section from near-surface comprised uniform clay followed by a pebble layer which had to be penetrated before entry to material in which relict bedrock textures might be found, occurred. The stone layer is considered to mark the base of transported soil material, with in situ weathered rock below it in most cases. Apart from soil creep and K-cycle boundaries, the stone layer may simply represent the base of the infilling of the holes left when trees fall over. The transported soil layer appears to be normally 0.5 to 1.5 m thick.

5.1.3 Mass movement deposits

Deposits suggestive of mass movement on a larger scale than soil creep - landslips or mudflows for instance - were detected as fossil gully fills exposed in the road-making work. Such features may be common but cannot be readily detected from surface or hand auger evidence.

5.1.4 Quartz gravel

A gravel with angular clasts up to 5 cm across and composed of vein quartz and quartz dominant rock types occurs on some of the ridge and plateau relicts of the 400 m and 460 m plateau surfaces and on the upper portions of the adjoining slopes.

It was not found over a basalt bedrock nor was it universal over a greenschist bedrock although it was found in some areas where the greenschist lacked abundant quartz veins. In Savage River town the principal source is a Tertiary conglomerate.

It appears that the deposit consists largely of material derived from a lag deposit originally developed when the plateau areas were more extensive. The failure of the gravel to cover basalt areas may be explained if these remained slightly higher in the landscape under the weathering regime then in force, which requires a strong solutional component. The gravel may have been confined to channel areas and areas close to suitable source material, hence the inconsistencies of its present distribution.

Some elements of the original lag deposit may survive though it is suspected that most of the deposit is a Quaternary cover reworked from the old material.

5.2 Tertiary - Introduction

The rocks in the area that are unequivocally of Tertiary age are the basalt and the conglomerate which may occur below it. There is also some regolith material (deeply weathered rock) below the basalt which is probably also Tertiary. Erosion surfaces of the area are thought to be post-basalt but still Tertiary in age.

5.2.1 Basalt

The basalt is fine grained and without obvious distinctive varietal features in hand specimen. The area covered by basalt proved to be very extensive by comparison with the amount shown on the Burnie 1:250,000 sheet. It is possible that two ages of basalt are present in the area as the eastern basalt area has its base at a substantially higher elevation than that of the western basalt area.

5.2.2 Conglomerate

The better developments of the conglomerate occur outside the area, for example at Savage River town and at Brown Plains. In these exposures the conglomerate is comprised of coarse cobbles of grey and white quartzite, schist and vein quartz in a poorly consolidated sandstone matrix (sometimes silicified). Most occurrences lack basalt cover. In the area, such conglomerate attributed to the Tertiary as was found was float and resembled the Precambrian conglomerate, so it is possible that only Precambrian conglomerate exists in the area. The occurrences at 475150 and in the Little Donaldson River are thought to be Tertiary because they are upstream of Precambrian congolomerate rock bars, eg, at 467122.

5.2.3 Sub-Basalt Regolith

Kaolinised rock in various pastel colours - pink, yellow or white - occurs immediately below basalt along the pipeline road (ex greenschist) and at the hairpin bend on the I.M.I. access track (ex tillite).

5.3 Permian

The Permian sediments comprise tillite and ice-rafted pebbly mudstones, bedded mudstone and minor sandstone. The boundaries of the Permian are sharp and linear and as they do not correspond with the dip and strike measurement taken in Broderick Creek they are interpreted as faults.

The sequence is tillite-mudstone-tillite, with the lower tillite formed in Broderick Creek and the mudstone and upper tillite exposed from 505129 to 513133 along the access track.

5.4 Precambrian - Introduction

Considering the area west of the Permian belt, there is a distinction between an eastern belt of metavolcanics represented mainly by greenschists and a western belt of metasediments which may continue well beyond the pair of ridge-forming sandstone/conglomerate beds which were used as a natural limit of the area of interest. Mostly observed dips are to the west, and although there is some evidence for superimposed folding it appears the area contains a simple west-dipping sequence.

Divisions can be made as follows:

5.4.1 Greenschist Unit

There is fairly good exposure along the access track from 505129 to 495125, and in this section there is only greenschist exposed. From 495125 to 491122 there is greenschist interspersed with thin but relatively resistant grey slate or phyllite beds. The occurrence of a pyrite bearing white carbonate rock (magnesite?) in stream sections at 495112 and 499138 suggests that there are some generally non-outcropping carbonates in the sequence also. The magnetic anomalies lie near the western limit of this belt.

5.4.2 Pyroclastic Marker

This unit contains three sub-units with different and distinctive resistant components. From the east there are beds with the appearance of a well bedded shale or siltstone, which lacks altogether any obvious metamorphic texture in hand specimen although unoriented, greenschist grade metamorphic minerals are detectable in thin section. There are grey and green colour phases present in the good exposures at 489124 and 492138, but at 492101 only a small amount of the green phase is present and the remainder of the unit appears to have converted to grey and green phyllite.

The second distinctive bed is a pale green pyroclastic rock with sparse clasts up to 102 cm across in a fine grained matrix.

The third bed contains numerous flattened clasts up to 1 cm in the long dimension and a conspicuous cleavage. Many clasts are white and the matrix is grey to green. Good exposures occur at 486104, 488130 and 489137.

5.4.3 Slate Unit

Much of the area likely to be underlain by this unit is covered by basalt, so the unit is known from the section along the Little Donaldson River only and there are many gaps in the exposures. Outcropping rocks vary from phyllite through slate to virtually uncleaved mudstones in their metamorphic character and from grey pelites to black carbonaceous, pyritic pelites in composition with minor black chert. Sample 1004 from outcrop at 475127 is an interbedded grey and black pelite with the appearance of possible graded bedding, but this was not confirmed by thin section examination. However, "cut and fill" features indicated west-is-up facing compatible with the expected facing direction.

5.4.4 "Dolomite" unit

In the Little Donaldson River section, a 500 m stretch virtually without outcrop is interpreted as a dolomite area on indirect evidence. Dolomite exists along strike in the Harvey Creek area 10 km south, and at 100467 a doline was encountered in an area of basalt, which is most easily explained as a subjacent collapse feature which implies an underlying carbonate rock.

Basalt cover is practically universal in the belt and it is suggested that the basalt followed a solutional lowland in the pre-basalt surface.

The one outcrop in this stretch of the river was a fine grained sandstone with concretionary structures of a form normal in impurity beds in a carbonate rock.

The last 50 m before the conglomerate marker (see below) comprise a well bedded slate.

5.4.5 Conglomerate Marker

A short gorge occurs at 467122 where the Little Donaldson River crosses the basal conglomerate bed of the marker. This bed is a quartzose small cobble conglomerate, and it is overlain by sandstone and some pebble conglomerate. The unit is resistant and is expressed as a marked strike ridge. A similar strike ridge exists about 500 m west and this pair of strike ridges is the most reliable mappable unit in the area.

5.4.6 Grey slate unit

A portion of the weaker beds lying between the two strike ridges has been examined between 466122 and 462115. In this area grey slate and phyllite are the main rock types with some carbonaceous and pyritic slate or phyllite.

6. STRUCTURE AND METAMORPHISM

There is a general N-S strike and steep westerly dip of cleavage throughout the area. True bedding is usually not distinguishable, thus the assumption of bedding plane cleavage is somewhat arbitrary although it is often supported where true bedding can be detected. The major division between these metavolcanic greenschist sequence and the slate sequence is considered to be conformable since the comparatively thin pyroclastic marker appear to persist at the boundary.

Multiple lineation directions and crumpling of the phyllites suggest that complex superimposed folding may be present in the area, but not necessarily on a large scale.

The slates that are interstratified with the greenschists imply that the appearance of stronger metamorphism of the schists may be an illusion caused by different source materials having a variable response to essentially the same metamorphic conditions. Thus the "Arthur Lineament" need not be a major tectonic feature. The belt of magnetic anomalies appear now to outline an essentially stratigraphic formation of greenschists.

If a significant boundary exists in the area it may well be the western edge of the "psammitic association" of the Whyte Schist.

7. GEOCHEMISTRY

As it was decided at the outset of the programme that the magnetic anomalies would be tested by soil sampling, the stream sediment sampling was designed rather as a control for further work. Line spacing between soil traverses is based on target size considerations, specifically that an orebody of useful size would be expected to have some geochemical expression over a 500m strike length. The spacing is considered somewhat over large for reliable contouring of the sample data.

7.1 Soil Sampling Programme

The sampling traverse lines were set up using 50 m pegs labelled with a reference number approximating the A.M.G. reference for that point. For the E-W lines sample spacing was 25m except where there was evidence of basalt cover. For N-S lines the basic spacing was 50 m with some interpolation to 25 m along the south of the baseline.

The samples were collected using 1 m hand augers, often taking advantage of natural hollows in the ground surface, such as the pits left behind by uprooted trees, in order to gain deeper penetration.

As explained in the section on geology, the layering encountered in soils was mainly of stratigraphic rather than pedogenic character, but the organic topsoil cover can be considered an "A" horizon, the transported soil layer with its lenticular basal stone layer a "B" horizon, and the in situ weathered rock a "C" horizon.

The ideal of the sampling procedure was to penetrate through the covering layers and collect a sample in which relict textures of the bedrock could be recognised after breaking open the compacted auger cuttings. There was usually a definite colour change where the "C" horizon was entered.

It was not always possible to achieve the desired level of penetration, and where the sample taken was not a genuine weathered bedrock it was noted as a poor sample. Areas with a capping of quartz gravel were particularly troublesome. Occasionally, silicified or hard outcropping rock hampered collection of a weather rock specimen.

Samples were sieved to -80 mesh prior to analysis by Analabs, Burnie. One sample batch of -40 + 80 mesh samples were also assayed. The method used for preparation was perchloric acid digestion, and for analysis, atomic absorption spectrometry. Analabs code 101 Detection Limit 5ppm for Cu, Pb, Zn.

7.2 Stream Sediment Sampling Programme

Access for stream mud sampling was by means of the larger creeks and the Little Donaldson River supplemented by use of the cut lines. Minor creeks are usually very overgrown and so were not used in this survey. Freshly deposited silts were collected, sieved to -80 mesh and analysed by Analabs, Burnie, using the same procedures as for the soil samples.

7.2.1 Results

It was found that background values were of the order of Cu 15 ppm, Zn 50 ppm, Pb <5-10 ppm.

One isolated sample LDS 198 from a large creek in the slate belt may warrant some follow-up work; it has values Cu 40, Zn 110, Pb 20 ppm. This is the highest lead value in a stream sediment sample.

(Extract from "Report on Field Investigations within EL 4/61 West Coast, Tasmania: Summer Field Season 1982-83")

8. GEOLOGY

In this summer field season little attention was paid to the post Precambrian geology and no evidence was found to compel modification of last season's interpretations.

Within the Precambrian, however, the facing of the sequence was considered to be westward last season, on the basis of a sample which appeared to be a west facing "graded bed". However, petrological examination did not confirm the apparent graded nature of the sample. In this season's work several east facing graded beds, scour and fill, and flame structures, were found, so it is now considered that the sequence faces East and is overturned to give the westerly dips so prominent in the McAuliffe Creek area. This interpretation makes the area compatible with the regional interpretation of Gee (1967).

In detail work, the dolomite unit inferred to exist from indirect local evidence and extrapolation from distant outcrops was found in outcrop in a cenote (water filled doline/ [sinkhole]) in the bed of a creek tributary to the "Little" Donaldson River.

The dolomite unit is located further east than previously thought, and there is more slate country between it and the sandstone/conglomerate bearing beds equated with Spry's Donaldson "Group". These slate beds were explored in a traverse of the Donaldson River. The dolomite is probably the Savage Dolomite. The current interpretation is shown in Plan 1.4.

Note: A mapping error is indicated in the terms "Donaldson" and "Little Donaldson" Rivers. The Little Donaldson is much bigger than the Donaldson. With respect to Spry's Donaldson Group, this would be better termed a Formation, with the units into which it is divided at Mt Donaldson given member, lens or tongue status.

9. SAMPLE PREPARATION AND ANALYSIS PROCEDURE

9.1 Soils Geochemistry Sampling Projects

Samples were sieved to -80 mesh prior to analysis by Analabs, Burnie. The method used for preparation was perchloric acid digestion and for analysis, atomic absorption spectrometry, Analabs code 101.

9.2 Southern Anomaly

As outlined in last season's soil sampling programme, a peak copper value of 1000 ppm was found in the axis of the Southern anomaly at grid reference point 490 110. During this field season a small scale grid was implemented to further investigate this peak copper value. (The structure of this grid is outlined in Plan 2.1.)

9.3 Line 12.5

Introduction

A magnetic anomaly 1.5 km west of Camp One (grid line 12.5) was selected for soil sampling due to its position occupying an inferred carbonate bed, hence the possibility of replacement mineralisation.

Results

Copper Zn values across this anomaly are considered low with copper, having a range of 25-120 ppm. The notion of replacement mineralisation along the carbonate bed is supported to some extent. The lead values throughout IMI's Northern Area are consistently <10 ppm. However, on line 12.5 40% of all values were >20 ppm with a peak value of 35 ppm.

Conclusion and Recommendation

Admittedly these Pb values are low. However, Line 12.5 is the only instance where this carbonate bed has been sampled. Further delineating the areal extent of this bed and follow-up sampling is proposed.

9.4 Line 14.4

Intended to test an elevated Pb value in stream sediments. No interesting response was found.

10. NORTHERN AREA STREAM SEDIMENTS GEOCHEMICAL SURVEY

10.1 Introduction

The area covered this season extended West and North of the area previously sampled, sections being (a) the Donaldson River and tributaries in the NW quarter of the area; (b) the lower reaches and tributaries of the "Little" Donaldson River; and (c) South from here to the boundary of the Arthur River map sheet, small tributaries of the Donaldson and Savage Rivers.

10.2 Location and Access

The road constructed last season was upgraded and extended to a new camp located 8 km NW of Savage River. Remaining access was by cut line, mostly following grid line 45E.

10.3 Relief and Drainage

The area is dominated by a pair of sub-parallel strike ridges of modest relief flanked by a plain in which the main rivers are entrenched by about 10-20 metres. The two Donaldsons run WSW about 2 km apart, piercing the strike ridges with a largish tributary system entering from the North passing Pyramid Hill. Another collection of unnamed creeks in the SW [(c) above] run west to join the combined Donaldson Rivers outside EL 4/61. A small area in the S.W. of the sampling project area drains to the Little Savage River.

10.4 Vegetation

The area included small crowned Nothofagus forest with celery top pine, etc., and relatively dense horizontal understorey with belts of tall ti tree/Bauera and Eucalyptus/Bauera marginal to relatively open heathland with ti tree and buttongrass. Pure buttongrass areas were rare.

In the South of the area some genuinely open country occurred, coinciding with an area burnt shortly before the Burnie concession colour photography was flown. The heathland which escaped this fire now includes areas of dense ti tree up to 5 m high which is difficult to penetrate. In these areas the buttongrass appears to be dying out.

10.5 Geology

The stream sediment work extended west into some ground not discussed in last season's report. There appear to be two definable units: (a) The presumed Donaldson Group, distinguished by the presence of some thickish sandstone beds, some conglomerate, and some cross bedding, although outcrop is poor, so that most of the unit may well be pelites - even 95% pelite; (b) The underlying rocks, perhaps the Interview siltstone, comprising an alternation of pelites with thin graded sandstones. Good east facing, east dipping outcrops were found at Camp 2 (flame structures) and on the Little Donaldson at 450 111 (graded bedding). Some black pyritic shale is exposed on the rock ("amphibolite") which appears to be the source of a broad local magnetic anomaly. It is thought to be an intrustion.

line missing? ?

10.6 Sample Preparation and Analysis Procedure

The samples were sieved to -80 mesh and the fine fraction analysed at Analabs, Burnie. Preparation was by perchloric acid digestion and analysis by atomic absorption spectrometry. Method code 101 with detection limits Cu 5ppm, Pb 5ppm, Zn 5ppm. The -40+80 fraction has been retained at Savage River.

11. DONALDSON RIVER AREA SAMPLING PROJECT

11.1 Donaldson River Area

Introduction

A stream sediment programme was undertaken in the Donaldson River drainage basin during the months of February, March and April 1983. All tributaries of the Donaldson River were sampled for freshly deposited silts in an attempt to provide a broad geochemical base. Specific magnetic anomaly targets were selected within the Donaldson River drainage basin, and the small streams and larger creeks draining these anomalies were sampled in an attempt to find whether or not a quantative relationship existed.

11.2 Results

Copper (N = 63)

- Mode (measurement which occurs most frequently) = 5 ppm.
- Median (irregular distribution of data hence median is used in preference to mean) = 5 ppm.
- Anomalous samples) DS 317 = 185 ppm; DS 327 = 180 ppm

Zinc (N = 63)

- Mode (polymodal) = 10, 15 ppm
- Median = 25 ppm
- Anomalous samples DS 311 = 115 ppm; DS 317 = 135 ppm; DS 327 = 110 ppm

Background values were (as defined by median):

Cu	10 ppm	(74% of samples below this)
Zn	25 ppm	(74% " " " ")
Pb	<5-10 ppm.	

Two samples locations yielded anomalous values for both copper and zinc. They were DS 317 (G.R. 475152) and DS 327 (G.R. 473147)

DS 317 has values of 185 Cu, x Pb, and 135 Zn. However, this result appears of little interest when one considers that:

- Sample DS 323 which is at the head of this stream has low Cu and Zn values (10 ppm and 45 ppm respectively).
- Thick, Tertiary conglomerate and basalt outcrop along Grid line 15.0 which is in very close proximity to the sample location.
- The catchment of the stream does not drain any magnetic anomaly.

This isolated copper and zinc value may represent a sample taken at point source - that is, a window through the overlying basalt into the underlying Precambrian metasediments.

DS 327 has values of 180 Cu, x PB, 110 Zn. This sample was taken in a large tributary of the Donaldson River, 20 m downstream of a junction between two creeks. Samples were also taken in each of the creeks yet both returned very poor copper and zinc values.

Ferric hydroxide "flowstones" derived from groundwater springs were encountered in two locations, DS 330 and DS 339, and were thought to be a "scavenging" environment for metal ions. However, the Cu, Pb and Zn values were poor.

The main geochemical trend noted was that downstream of sample location DS 335 all zinc values are <25 ppm, whereas upstream of this location, 16 out of 24, or 66%, have values >25 ppm.

This "Zn rich province" peaks at sample locations:

DS 310 - 75 ppm
DS 311 - 115 ppm
DS 317 - 135 ppm
DS 327 - 110 ppm

Perhaps the most interesting point to note is that in this province, Zn values outstrip copper values in every case.

11.3 Conclusion and recommendation

Stream sediment values were poor and failed to adequately delineate any substantial anomaly; therefore, no further investigation is warranted.

12. LITTLE DONALDSON RIVER SAMPLING PROJECT

12.1 Introduction

The stream sediment sampling programme during the 1981-82 Summer Field Season had succeeded in sampling approximately half of the Little Donaldson River within EL 4/61. Further investigations during the month of April 1983 successfuly completed the remainder of the sampling programme up to the western boundary of the lease.

12.2 Results

Copper (N = 19)	Zinc (N = 19)
- Mode = 5 ppm	- Mode (polymodal) 10, 15, 20.
- Median = 5 ppm	- Median = 20 ppm
- No anomalous values.	Anomalous Zn values L.D.S. 301 = 140 ppm " 303 = 140 ppm " 304 = 130 ppm " 306 = 145 ppm

For the remainder of the Little Donaldson River the values obtained were very poor, especially in Cu where 78% of all values were <15 ppm. The majority of zinc values were also low.

12.3 Conclusion and recommendation

The only feature worthy of note was a group of four samples (LDS 303, 304, 301 and 306, G.R. 484 139) whose Zn values were in the range of 130 to 145 ppm. This zinc "anomaly" is also supported by a substantial 'kick' in copper at these locations (60-85 ppm). However, it is felt no further work is warranted here.

13. THE MINOR DONALDSON TRIBUTARIES AREA

13.1 Introduction

A general reconnaissance plus the presence of two small magnetic highs prompted a stream sampling programme in this area. The majority of streams sampled within this region were of minor size. Access consisted of a cut baseline (Line 45) which was cut south for a distance of 4 km and by the less overgrown streams.

The vegetation on the lower slopes and plains surrounding the "buttongrass" ridges consisted of eucalypts, Bauera and ti-tree and was extremely difficult to traverse. This problem was significantly overcome by use of aerial photographs which highlighted the more open areas for easier access.

13.2 Results

The work in this area tested a different geological terrain. Prior work in IMI's Northern area had been in Precambrian metasediments and metavolcanics, whereas in this new area the few outcrops were sandstones and pebbly sandstones, with rare slate/mudstones in gully sections.

The area did seem less promising that the metavolcanic area to the east, despite some potentially hopeful magnetic features (the magnetic anomalies could easily be only igneous intrusions), and some pyritic black shales.

The results indicate generally very low backgrounds: the peak copper value was 35 ppm, and from 59 samples collected, 91% had Cu values <10 ppm. The magnetic features which were tested showed no change from the prevailing background.

13.3 Conclusion and recommendation

The area sampled is considered to be "barren", hence no further investigations are warranted.

PART 1 (B)

BADGER PLAINS BLOCK - SOUTH

(Edited extract from "Report on Field Investigations Within Exploration Licence 4/61, West Coast, Tasmania: Summer Field Season 1983-84, Part 1: Geochemical Programme Northern EL 4/61")

1. STREAM SEDIMENT SAMPLING

1.1 Metals

Previous stream sediment sampling in the Savage River area involved the collection of -80 mesh material from stream deposited silt banks. Unfortunately, although this method may be suitable for the detection of base metals, it is not suitable for the more erosion resistant minerals of tin, chrome, rare earth and precious metals.

Therefore, the programme was oriented towards collecting the heavy mineral portion of the sample (as a pan concentrate). In addition, a sludge (or fines) sample was collected as a more sophisticated (and reliable?) technique of obtaining a -80 mesh sample. In addition to base metals, very fine grained heavy minerals (particularly cassiterite, which is known to have a very fine grained component) are more likely to be detected in this fraction.

Method

An on the spot assessment is made of the drainage to determine the optimum sampling points (known as trapsites). Trapsites are essentially energy drop situations and are of the utmost importance in the obtaining of a correct sample. A suitable sample, in appearance, should contain all size ranges from clays and silts to large boulders.

Trapsite Criteria

In the determination of what constitutes a suitable trapsite, the following criteria (in order of decreasing desirability) are applicable:

I) Natural rock crevices in the drainage base, particularly where these oppose the water flow;
II) The downstream side of large boulders where eddy currents can be set up; and
III) Rocky creek beds, which essentially are a smaller version of II.

If at all possible, these criteria should be combined with:

i) The outwash side of a waterfall;
ii) The outer edge of the downstream side of a curve in the creek.

Sampling Technique

Once a suitable sample site was selected, the interstitial gravel was collected with a bog shovel with some boulders being moved by hand. The gravel was heaped in a 5 litre capacity prospector's panning dish to approximately 10cm. It was then worked with a little water to remove stones down to about 3cm diameter, at the same time releasing the associated fines. This thin mud was then decanted into a large plastic bag in order to settle. Where the gravel sample ceased to produce copious muddy water it was cleaned with an excess of water and panned down to produce a rough heavy mineral concentrate which was collected for laboratory examination. Normally two panning dishes provided sufficient material for the fines sample. When the mud was allowed to stand it separated out into a sand layer, a sludge layer, and a supernatent fluid of muddy water with a distinct boundary with the sludge. This fluid was carefully decanted, then the sludge layer was collected taking care to reject the sand.

Both sludge and heavy mineral concentrates were carried out in sealable plastic bags. At base the sludge was allowed to stand again, then the dense sludge was transferred to a kraft paper bag and dried. Early experimentation showed that sludge samples collected in this manner contained virtually only -80 mesh material so subsequent samples were not seived. The sample was then sent away for analysis.

Fifteen pannings per sample was initially deemed sufficient to provide an adequate heavy mineral sample. This number of pannings was determined on the basis of laboratory requirements for quantitative assessment of the sample if required.

Where only minor drainages or limited sample material zones were selected for sampling, three pan samples were taken. However, towards the end of the field season, it became apparent that three pan samples generally provide sufficient material for identification and correlation with other samples. Consequently, all subsequent samples were taken this way.

In the panning process, a quantity of quartz was retained in the pan concentrate. This is unavoidable as some of the heavy minerals have a specific gravity not greatly in excess of that of quartz, and so, to prevent loss of these, some quartz (and light material) was retained.

This quartz is currently being removed by heavy media separation (tetrabromoethane) and then the heavy mineral concentrate will be re-examined, and analysed if required. A brief field examination is made on the spot and notes made if required (e.g. if gold is present, etc).

1.2 Diamonds

Diamond search depends on identification of indicator minerals in heavy mineral (H.M.) suites. These indicators are typically scarce, hence large volume samples are required. Trapsite selection criteria are essentially the same as for routine heavy mineral sampling save that some care has to be taken in avoiding very energetic sites in which the less dense heavy minerals will be flushed out, e.g., diamond and chrome diopside. Also, the large volume required causes some otherwise good sites to be avoided.

In practice, sites in the lee of a large boulder some metres downstream from a cascade were usually selected. In a few cases it was possible to find a deep pothole associated with a cascade. In practically all cases some specks of gold were found in panning the H.M. series samples taken in association with the diamond samples and this was considered an adequate field test of trapsite suitability, though in general terms it was felt at the time that ideal sites were not occurring. It was rare to find a site which could be excavated down to bedrock.

The trapsite gravels were excavated by removal of associated boulders by hand and shovelling out the finer gravel which was then passed through a sieve of 1/8" mesh (approx. 3mm) and the oversize portion was dumped. The sand passing the sieve was collected in a panning dish, and transferred to a standard sized bag for which a 20kg mark had been determined previously. This sample was carried out.

After a trial batch of samples had been examined after separating the heavy mineral fraction by heavy liquid only, it was considered safe to reduce the remainder of the samples by panning to a rough concentrate of 20-25% of the original before separating the remainder by tetrabromoethane.

The extent of grain loss can be deduced by comparing the first batch (LSD 7, 18, 26) with the remainder of the samples.

The diamond sampling program was conditioned by the historic records of diamonds from the area originally termed Badger Plains and the detection on the air photos of a cluster of large and well defined vegetation anomalies in the licence area which could conceivably be kimberlites. The programme was directed towards testing these features as possible diamond sources.

2. SOIL SAMPLING

Bedrock mineralisation is generally reflected in residual soils, and therefore soil sampling is probably the quickest and easiest way to locate this mineralisation. Generally this technique is used as a follow up to more regionally orientated exploration programmes.

In textbook circumstances the typical soil of humid temperate climates is the podsol, which is characterised by layers termed A, B and C which describe a leached zone (A), an "enriched" zone (B) in which iron and clay minerals accumulate, and (C), a zone in which weathering occurs without significant enrichment of clay minerals from higher up, and gradational into parent rock. The soils present around Savage River are nearly always complicated by the presence of a transported layer of gravel which overlies a truncated soil profile, and itself shows evidence of pedogenic differentiation. In the following discussion the term "B" horizon is applied to the gravel layer, and the term "C" horizon to material from below this layer (which on occasions may contain structureless clays that are actually the B horizon of the lower soil). The usual practice adopted for sampling was to collect the first material containing softened but recognisable bedrock textures. Hard chips of rock associated with structureless clay are considered "B" horizon. In general the "C" horizon samples are genuine C horizon material, but "B" horizon is not true B horizon in the pedologists strict sense.

Hand augers were used for the soil sampling as the nature of the terrain and vegetation necessitate the use of light, portable equipment.

In areas where the angular gravels do not exist, obtaining a "C" horizon sample is generally not difficult, although depth may be an occasional problem. However, in areas covered by the angular gravels, real problems in terms of penetration can be encountered.

To overcome these problems, a 4" post hole auger was used for the gravel penetration, followed by a 2" shell auger for the actual sample collection. Occasionally, a crow bar was necessary to assist in the gravel penetration.

In some areas "C" horizon samples were not possible because of bedrock outcrops (rarely). In this circumstance, rock chip samples were taken and the results incorporated with the soil sample programme.

By the use of these methods, very few "C" horizon samples were unobtainable. However, where this circumstance did arise "B" horizon, or interstitial fines from gravels, samples were taken from the auger hole at its maximum depth.

3. GEOLOGY

Observations on geology were made in passing during the sampling programme rather than as systematic traverses intended to serve as a base for a mapping programme. Nevertheless, it would now be possible to produce a photo interpretation map with the data available with the aid of data loaned by N. Turner of the Mines Department.

Specific problems received greater attention, particularly the Tertiary Gravels.

The geochemical sampling by soil auger proved incidentally to be a useful tool in picking unit boundaries.

Work on the Tertiary rocks of the area is advanced enough for a final description, but for the Precambrian further revisions are likely, so an outline only is given below.

3.1 Precambrian

It is considered that the bulk of the area is occupied by a simple eastward facing rock sequence which unconformably overlies the Rocky Cape Group and is truncated by the Meredith Granite. In the upper exposed portions there are rocks assignable to the Oonah Formation (N. Turner pers. comm.). Rocky Cape Group outcrop occurs mainly to the west of the exploration licence area although it is present in the north west section. The basal unconformity is adequately established at Mt Donaldson (N. Turner pers. comm.). Rock fabrics give abundant evidence of superimposed folding, but the aeromagnetic trends, which are considered to be stratigraphically controlled, indicate an orderly structure except where the trends converge near Main Creek. In this area the trends are crossed by a major NNE trending fault with right lateral displacement, and re-emerge in the north of the exploration licence area where the fault has been mapped previously. The fault can also be traced south to the coast at Ahrberg Bay.

Dips are normally steep and to the east. Most westward dips are thought to be overturned. Although thinbedded sandstone beds considered to be turbidites with original graded bedding are common, the grain size is mostly too uniform to allow facing to be determined from them.

The sequence can be divided into five units, with further subdivisions possible.

1. A unit of slaty mudstone and quartzwacke turbidite with conglomerate and cross bedded sandstone at the base and top.

2. A unit consisting of dolomite, volcanics and dark grey slate. The slate becomes predominant in the north at the expense of dolomite.

3. A unit of generally schistose turbidites with greenstones interpreted as basic metavolcanics, possibly largely pyroclastic. At the top is a member containing the magnesite and magnetite ore. There is minor slaty mudstone and carbonate.

4. A unit of generally schistose quartzwacke turbidites, grey slate, and graphitic slate. Also with some green tuffs. Vein quartz is abundant.

5. A unit of grey and red-brown mudstone (not exposed in E.L. 4/61).

3.2 Tertiary

The Tertiary rocks comprise sheet or channel filling gravel, sand or clay generally in ridge top situations, basalt as flows and possibly plugs, and are included in some, if not all, of the "circular anomaly" features of the area, some at least of which are sinkhole fillings of Tertiary sediments, although others would be of igneous origin and not necessarily of Tertiary age. The elevation of the Tertiary alluvial and erruptive rocks tends to be lower in the south, and could reflect warping of the area. However, a undeformed series of stepped erosion surfaces seems adequate to explain the height distribution of the Tertiary rocks.

The heavy mineral content of the gravels was examined to assess (a) its potential as a placer deposit of tin, gold, etc and (b) its contribution as a contaminant of heavy mineral suites from creeks in the area generally. In the process an acceptable reconstruction of the Tertiary history of the area was arrived at.

Rock units and commentaries for the Tertiary deposits are as follows:

1. "Bullocks Head Gravel"

This unit is a polymictic cobble gravel confined in general to channels and best developed in the town of Savage River but also present at Brown Plains. It occurs at more than one level and is overlain by basalt, thus its deposition ranges from pre basalt into the period of basalt eruption.

Clast range up to boulders of 0.5m diameter, though mostly clasts are in the cobble size range. The rock types represented include quartzwacke sandstone, vein quartz, quartz tourmaline rock, greisen, and rarely leached volcanics resembling dykes in the town area. The associated sand is of granite wash aspect and includes quartz, feldspar and tourmaline.

The heavy minerals indentified in the field comprised:

tourmaline
monazite and/or topaz
garnet
nodular pyrite (not universal)
fine grained magnetite (not universal)

The proportions varied quite widely between different occurrence areas, and are attributed to an original drainage pattern directed outwards from the Meredith Range in which each channel collected sediments from a separate, small area.

2. Basalt

Basalt outcrops are rare south of the mine area. Basalt overlies gravel in the mine area itself near "B" Dump. There are accessible outcrops at 505035, and at 445902 on the Corinna road. But the drainage pattern of the Whyte, Savage and Donaldson Rivers is readily explained as an incised drainage developed on a sloping basalt surface, since the rivers are broadly parallel and the Whyte and Donaldson are fixed where the flows would have abutted against high ground.

3. "Brown Plains Formation"

This unit is an oligomictic pebble gravel occurring as a sheet deposit capping well preserved areas of plateau surface, and rarely more than 4m thick. It is best developed at Brown Plains along the Whyte River gauging station track. Beneath the gravel there are sometimes sand and clay beds which are probably part of the same formation. Certain of the clays are well bedded and rest directly on a planated bedrock surface and are presumably lacustrine.

The gravel consists dominantly of subrounded clasts of vein quartz up to 10cm with some quartz tourmaline rock and greisen, and very rarely some quartzwacke sandstone.

The gravel also exists at Badger Plain and in one or two spots in the Savage River town area. At a gravel pit on Heazlewood Cresent this gravel occurs on a surface substantially higher than nearby outcrops of "Bullocks Head Gravel". It has not been observed overlying basalt directly, but since it is intimately related to erosion surfaces that apparently truncate the basalt, a post basalt age is probable.

The heavy mineral content was diverse and relatively constant. It included the following (field identifications):

tourmaline
garnet
monazite and/or topaz
red cassiterite
magnetite
chromite and/or spinel
gold (minor)

Concentration of these minerals occurred in creeks draining the gravel area.

Discussion

The presence of chromite and cassiterite proved a useful diagnostic tool but the problem of source is made more difficult because the Whyte River lies between the Brown Plains area and the serpentinite and granite margin areas considered the likely sources for the chromite and cassiterite respectively.

The gravel deposit could be accounted for as a beach deposit from a lake on a coastal plain which would allow longshore currents to act on material from a variety of sources.

The limiting factor is the degree of rounding of the gravel clasts which is compatible with wave action in sheltered water, but not of existing rivers or seacoast gravel.

A possible mechanism which allows the prior drainage to be re-established after the erosion surface episode is completed starts with erosion of drainage followed by rise in sea level to produce a ria coastline. Ria coasts tend to mature into barrier beach-lagoon coasts with coastal processes tending to bevel away the interfluve areas. The coast of New South Wales, for example, shows a diverse collection of forms all presumably developed from a ria coast existing at the close of the Flandrian transgression in which the floors of large lagoons, such as Tuggerah Lake, presumably consist of filled deep valleys and shallow planated platforms with sediment veneer. If the sea level returns to its former level or below it the original drainage would tend to be completely re-excavated while sediments would be more probably preserved on the bevelled interfluve areas.

Pipe Structure Occurrences

It is thought that infillings of subjacent collapse dolines account for the presence of Brown Plains Formation style pebble gravel in some paradoxical situations, in which direct derivation from an erosion surface related gravel sheet does not seem possible.

Examples include many tributaries of the Little Savage in which no erosion surface remmants survive but suspected in situ pipe filling gravel occurrences were found only at 483069 and by the Savage River road at Alford's Creek 551051. The Alford's Creek occurrence consists of "granite wash", coarse sand and granule gravel but contains chromite in its heavy manual assemblage. It is well exposed in a road cutting.

3.3 Quaternary

1. Alluvium

Alluvium is present along the beds and margins of most streams in the area. High terrace gravels are also common. Deposits are not extensive.

2. Residual Gravel

Angular quartz gravel is common, up to 1.5 m thick in places overlying the Brown Plains, and Bullocks Head gravels and also any areas underlain by Precambrian rocks rich in quartz veins. Parts of the gravel are cemented. Where Brown Plains gravel occurs, rounded pebbles may be found in the residual gravel but normally such pebbles are broken, which provides a usable criterion for distinguishing the gravels in the field. The gravel is a superficial deposit.

The heavy mineral content was related to the particular source of the gravel. Garnet is common where it is residual on Oonah Formation.

3.4 Analysis

Samples were collected at 404 soil sample locations and 306 stream sample locations. In some instances more than one sample was collected at a particular site.

All samples collected were pre-dried with the soil samples being sieved to -80 mesh prior to despatch and analysis to Analabs, Burnie. The oversize fractions were retained at Savage River.

Twelve rock samples were also collected (84/0001 - 84/0012) which were crushed, split and pulverised by Analabs prior to analysis.

Set out below is a table outlining the elements assayed for, the analytical method used, and Analabs relevant Code number.

Elements	Analytical Technique	Code
Cu,Pb,Zn, Ag,Ni,Co,Bi (5)(5)(5)(.5)(5)(5)(5)	Preparation by perchloric acid digestion and analysis by atomic absorption spectrophotometry (5) denotes detection limit claimed in parts per million.	101
Mo (2)	X-ray Fluorescence Spectroscopy	102
As (1)	Vapour hydride generation A.A.S.	114
Ba (stream sediments (5) HM 5-180)	Special acid digestion A.A.S.	120
Ba (Soil and stream (10) sediments HM 181-306)	X-ray Fluorescence Spectroscopy	401
Au (0.032) or (0.1)	Aqua Regia Digestion	301
W, Te, Sb (10) (3) (3)	X-ray Fluorescence Spectroscopy	401
Sn (3)	X-ray Fluorescence Spectroscopy	402

On one particular area of interest, the Waterfall Creek Magnetic Anomaly, AMDEL Laboratory Services were utilised (see table below).

Elements	Analytical Technique	Code
Cu, Zn, Co, N (2) (2) (5) (5)	Perchloric Acid digestion and A.A.S. (2) denotes detection limit claimed	C1/C2
Au (0.05)	Aqua regia digestion and A.A.S.	C3/1
Ba, As,Pb, Bi,Sn,U (10)(2)(2)(4)(4)(10)	X-ray Fluorescence	B/3

In conjunction with the stream sediment programme, 297 heavy mineral concentrates were also collected. At the time of writing, Analabs are conducting heavy mineral separations on the samples (code 1610).

Special Analytical methods used include: -

- Mineral scan by X-ray diffraction, Code 1650 (Samples HM 35, 36, 65, 66, 68)

- Qualitative examination of heavy mineral grain concentrates, Code 1615 (HM 7)

3.5 Bowry Creek

Samples taken from this creek and its tributaries predictably contain significant magnetite in the pan concentrates. In addition, there is a small portion of the Brown Plains Formation heavy mineral assemblage present.

4. STREAM SEDIMENT SAMPLING - DIAMONDS

4.1 Little Savage River

The area of interest in the Little Savage catchment is a wide lowland area in which the intriguing air photo vegetation anomalies are clustered. The wide low area in a relatively small stream contrasts with the gorge of the Savage River, so rocks that are weak with respect to erosion are present here (which supported the idea of kimberlites). Once the valley was examined, however, evidence turned up to suggest that it was underlain by a dolomite formation, since there was outcrop of dolomite with a little slate for about a quarter of the river bed examined. So another possibility had to be considered for the vegetation anomalies, that of karst subsidence related features. A cavity once developed can stope its way to the surface leaving behind a breccia pipe or ring fault bounded area, and a corresponding surface sinkhole can intercept gravels from any sheet deposit and these can then drop down the pipe with further subsidence, as in a hopper. Such features are well displayed in the McArthur District of the Northern Territory where there are gravel fills related to the Mullaman Beds (Cretaceous) and Bukalara Sandstone (Cambrian).

The valley is incised to a level well below the Brown Plains formation and sub-basalt gravels, yet it was found that most of the creeks contained abundant quartz pebble gravel similar in aspect to Brown Plains material (samples LSD 5, 8 and 9 were exceptions). Some creeks contained nothing else. It seems probable that this gravel is coming from gravel pipe structures. One possible example of gravel pipe outcrop was found in a subcrop gravel occurrence at 481065. The Savage River cuts through a possible breccia pipe at 479044 but the weak rock inside the feature is reflected by non-outcrop except for a large tilted block of dolomite. Outcrop in the river is nearly continuous outside the feature. This feature is not a gravel pipe and could be a kimberlite, but it unfortunately did not contain a creek that could be sampled.

The area was therefore downgraded as a prospect because some, if not neccessarily all, the air photo anomalies could be explained away, and the hope of getting samples uncontaminated by Tertiary gravel sources (which could have travelled from distant source areas) had been exploded.

The samples processed do not show any of the readily diagnosed kimberlite indicator minerals - no diamond, pyrope (kimberlitic garnet) ilmenite or chrome diopside. Spinels (including chromite), however, are common and work is in progress to determine if kimberlitic types are present. Distinction of spinels is by microprobe analysis. It has been determined that chrome spinel is present, but the diagnostic feature of complex zoning is not present (H. Zeissink, pers. comm).

Other grains recorded indicate (a) a granite area component in derivation; almandine (a non-kimberlitic garnet) topaz, tourmaline, cassiterite, rutile, zircon and (b) a serpentinite source area; chromite, spinel, gold? osmiridium. Gold and osmiridium were detected in greater abundance in pan sampling, possibly because grains of less than 40 mesh are readily visible.

Pyroxene is normally absent but is locally common and occurs in areas unlikely to be contaminated by basalt. Given the nature of metamorphism and lithology of the country rock (mostly carbonate and slate, some greenschist grade metavolcanics) a local igneous intrusive source is indicated in these catchments, eg, LSD 4, LSD 14 and possibly also LSD 2 and LSD 9. LSD 14 and LSD 9 come from features deemed the most likely to be genuine intrusions, LSD 2 is from Reid's Harvey Creek, the reputed source of diamonds and LSD 4 has associated with it spinels of "type 2" (see below). Topaz is absent in LSD 14 and LSD 16 which drain the same large anomaly area. Possibly the contaminating gravels here are from the sub-basaltic source only.

In this area and context the relevant minerals of the spinel group are chromite and spinel which cannot be distinguished from each other except by chemical means. This tends to produce loose usage of terms "spinel" and "chromite" for black grains that are actually mixtures of both.

However, both in the field and in the petrologist's report two types of "spinel" could usually be distinguished: Type 1 with very dark brown colour, pitted surface and a degree of rounding of the crystals; Type 2 with very dark brown to black colour, smooth surface and relatively sharp crystal edges. The forms probably reflect different source areas rather than different mineral composition. Type 1 grains have not been analysed but are thought to be basically chromites derived from the Bald Hill Serpentinite (although spinel may be present). A selection of Type 2 grains have been shown to contain both chrome spinels and chromites. Their sharp crystal edges suggest a local or at least closer source than those of Type 1 grains which are partially rounded.

In conclusion, the area is so heavily contaminated by material from distant sources that it would have taken a record of chrome diopside or a cluster of diamonds to have given a reasonable positive result. The "normal positive" of an odd diamond or pyrope grain would have to be considered ambiguous. It is perhaps fortunate that we were spared that dilemma, yet failure to replicate original diamond reports may mean the sampling and examination procedures were inadequate.

4.2.2 Savage Creek

The conditions here proved to be a repeat of the situation in the Little Savage River. The stream bed contained extensive outcropping pavements of dolomite with one 4m bar of slate and sandstone. Some Tertiary gravel contamination was expected since the creek heads in the known Brown Plain Formation gravel area of Badger Plain. But the tributaries which it was hoped would be free of this contamination carried the same abundant quartz pebble gravel and essentially the same heavy mineral suite. A local source of pyroxene is indicated by sample LSD 24.

4.3 Waterfall Creek Magnetic Anomaly - See Plans 4.1 to 4.5

The target of interest in this area was a minor magnetic anomaly aligned along the inferred major fault referred to above (see section 3.1.1), in an area where carbonates and/or volcanic rocks were anticipated. A soil sampling programme was conducted over the area and a supplementary stream sediment sample collected, ie, H.M. 83. Being a self-contained area examined early in the season, it was used as a de facto orientation exercise and its results are described below.

Copper

Copper values were low and sporadic ranging from 12 through to 510 ppm with the average value being 139 ppm. Only six (6) anomalous values (>246 ppm) were obtained (anomalous values being defined as the mean + 1 S.D.).

However, a broad zone of "elevated" copper coincident with the trend of the anomaly is apparent (see plan "4.2").

Lead, Tin, Tungsten, Bismuth and Gold

Lead, tin, tungsten and bismuth values were consistently below the limit of detection, with the few isolated "high" values being inside the prospective area. Gold values were all below the limit of detection, ie, <0.05 ppm. One notable exception being sample WA 00.100 45000, located in the centre of the anomaly, which returned a value of 0.20 ppm.

Zinc

Zinc values were also low with 15 anomalous values obtained (>100 ppm). As in the case of copper, zinc values mimicked the shape of the anomaly trend.

Cobalt Nickel Barium

Low, sporadic values were obtained for these elements with all the anomalous values within the prospective area.

Arsenic

Approximately 45% of arsenic values were 2 ppm or less. However, the remaining values again exhibit a broad "elevated" zone coincident with the anomaly trend. A smaller, separate arsenic anomaly to the south of the main zone was also noted (see plan 4.5).

It was not possible to achieve a satisfactory sample in nine (9) locations due to the presence of underlying Tertiary gravels in the N.E. corner of the grid.

Conclusion and Recommendation

The magnetic anomaly investigated showed a distinct change from the prevailing background especially in copper, arsenic and to a lesser extent zinc, this mineralisation being associated with a magnetite rich pod.

The anomaly was not conclusively "rounded off", and perhaps with a suitable implement the gravels could be penetrated. However, due to the small areal extent of the prospective area (coupled with the low values) no further investigation is warranted.

PART 2

BRODERICK CREEK BLOCK

Pipeline Road Area

(Extract from "Report on Field Investigations within EL 4/61, West Coast, Tasmania: Summer Field Season 1981-82. Part 1: Geochemical Programme Northern EL 4/61.")

1. INTRODUCTION

The area of interest was determined by a magnetic anomaly trend extending northwards from the Savage River magnetite. Although it was suspected to be caused by low grade magnetite, there was some interest in the area for base metals. Two culminations on the anomaly axis lie to the east of the pipeline road. (Ed: Subsequent magnetometer surveys placed the axis 1 kilometre further east in this area.)

2. LOCATION AND ACCESS

The area is centred 12 km NNW of Savage River and the anomaly peaks are within 2 km of the Pipeline road.

A series of cut lines were constructed from start points on the pipeline road itself, which functioned as a base line for the area.

3. RELIEF AND DRAINAGE

For details see Part 1, Badger Plains Block.

4. VEGETATION

The main vegetation communities are the beech forest and stunted Bauera forest types. For details see Part 1, Badger Plains Block.

5. GEOLOGY

STRATIGRAPHY

5.1 Quaternary - Introduction

Although something of a nuisance factor, an understanding of the nature and extent of the Quaternary superficial deposits is important in understanding and assessing relevance of a soil sampling programme, such as was undertaken in this field programme. Such cover is general and can be assumed to be present wherever actual rock outcrop is not present.

5.1.1 Alluvium

Alluvial cover is usually present alongside any stretch of creek or river which has attained an approximate base grade. Normally only a single flat level is present and this is subject to contemporary flooding. Traces of older and higher terraces were found. The presence of rock bars indicates that deposits are only 4 metres or so thick. Valley alluvium along even the largest river is normally less than 100 m wide but does reach 500 m in places along the Little Donaldson River.

5.1.2 Transported soil

Evidence for a near universal transported soil mantle was discovered in the auger drilling, where the most common section from near-surface comprised uniform clay followed by a pebble layer which had to be penetrated before entry to material in which relict bedrock textures might be found, occurred. The stone layer is considered to mark the base of transported soil material, with in situ weathered rock below it in most cases. Apart from soil creep and K-cycle boundaries, the stone layer may simply represent the base of the infilling of the holes left when trees fall over. The transported soil layer appears to be normally 0.5 to 1.5 m thick.

5.1.3 Mass movement deposits

Deposits suggestive of mass movement on a larger scale than soil creep - landslips or mudflows for instance - were detected as fossil gully fills exposed in the road-making work. Such features may be common but cannot be readily detected from surface or hand auger evidence.

5.1.4 Quartz gravel

A gravel with angular clasts up to 5 cm across and composed of vein quartz and quartz dominant rock types occurs on some of the ridge and plateau relicts of the 400 m and 460 m plateau surfaces and on the upper portions of the adjoining slopes. It was not found over a basalt bedrock nor was it universal over a greenschist bedrock although it was found in some areas where the greenschist lacked abundant quartz veins. In Savage River town the principal source is a Tertiary conglomerate.

It appears that the deposit consists largely of material derived from a lag deposit originally developed when the plateau areas were more extensive. The failure of the gravel to cover basalt areas may be explained if these remained slightly higher in the landscape under the weathering regime then in force, which requires a strong solutional component. The gravel may have been confined to channel areas and areas close to suitable source material, hence the inconsistencies of its present distribution.

Some elements of the original lag deposit may survive though it is suspected that most of the deposit is a Quaternary cover reworked from the old material.

5.2 Tertiary - Introduction

The rocks in the area that are unequivocally of Tertiary age are the basalt and the conglomerate which may occur below it. There is also some regolith material (deeply weathered rock) below the basalt which is probably also Tertiary. Erosion surfaces of the area are thought to be post-basalt but still Tertiary in age.

5.2.1 Basalt

The basalt is fine grained and without obvious distinctive varietal features in hand specimen. The area covered by basalt proved to be very extensive by comparison with the amount shown on the Burnie 1:250,000 sheet. It is possible that two ages of basalt are present in the area as the eastern basalt area has its base at a substantially higher elevation than that of the western basalt area.

5.2.2 Conglomerate

The better developments of the conglomerate occur outside the area, for example at Savage River town and at Brown Plains. In these exposures the conglomerate is comprised of coarse cobbles of grey and white quartzite, schist and vein quarts in a poorly consolidated sandstone matrix (sometimes silicified). Most occurrences lack basalt cover. In the area, such conglomerate as was found attributed to the Tertiary was float and resembled the Precambrian conglomerate, so it is possible that only Precambrian conglomerate exists in the area. The occurrences at 475150 and in the Little Donaldson River are thought to be Tertiary because they are upstream of Precambrian conglomerate rock bars, eg, at 467122.

5.2.3 Sub-Basalt Regolith

Kaolinised rock in various pastel colours - pink, yellow or white - occurs immediately below basalt along the pipeline road (ex greenschist) and at the hairpin bend on the I.M.I. access track (ex tillite).

5.3 Permian

The Permian sediments comprise tillite and ice-rafted pebbly mudstones, bedded mudstone and minor sandstone. The boundaries of the Permian are sharp and linear and as they do not correspond with the dip and strike measurement taken in Broderick Creek they are interpreted as faults.

The sequence is tillite-mudstone-tillite, with the lower tillite formed in Broderick Creek and the mudstone and upper tillite exposed from 505129 to 513133 along the access track.

For the Precambrian only the greenschist unit is present. The greenschist itself is the most common rock and a transition from schist with metamorphic segregation into quartzo-feldspathic and chlorite rich bands to a near massive rock with "relict phenocrysts" can be traced in the Specimen Reef drillhole core. The original volcanic appears to be an andesite. Other rocks found in the area are magnetite-quartz rock and graphite schist.

6. GEOCHEMISTRY - SOILS SAMPLING

The sampling of the northern and central pipeline road anomalies was hampered by extensive basalt and quartz gravel cover. One unexpected result was the presence of zinc values exceeding 200 ppm in an area of basalt. In the area where Precambrian rock is sampled there are no copper values significantly higher than 100 ppm or zinc above 200 ppm.

(Extract from "Report on Field Investigations within EL 4/61, West Coast, Tasmania: Summer Field Season 1982-83)

6.1 Pineapple Creek Anomaly

6.1.1 Introduction

East of the pipeline service road, in the drainage basin of Pineapple Creek, a magnetic anomaly was selected for sampling. Access was achieved by two cut lines, termed 16.7 and 16.4 respectively.

6.2.2 Results

Tertiary basalt was the dominant lithology along both cut lines. However, on the eastern fringe of the anomaly Precambrian greenschist re-emerged, and this area was sampled. However, in the vast majority of cases it was not possible to achieve a satisfactory sample due to the presence of Tertiary quartz gravels which blanketed the underlying greenschist.

As was to be expected, the element concentration was low (<100 ppm in all cases except one isolated high Zn value of 215 ppm).

6.1.3 Conclusion and Recommendation

Unless a satisfactory method of penetrating the overlying gravels can be implemented, no further investigation is warranted.

(Extract from "Report on Field Investigations within EL 4/61, West Coast, Tasmania: Summer Field Season 1983-84")

Stream Sediment Survey - Pineapple Creek

Samples were taken both upstream and downstream of a basalt capping to check the possibility of Tertiary gravels or mineralisation in the bedrock beneath the basalt. (Pineapple Creek has exposed the base of the basalt.)

The pan concentrates were quite small from samples upstream (east) whereas those near the pipeline road appear to contain significant haematite (and magnetite?)

Analysis of the fines indicates little of significance and no further work is recommended.

7. RECOMMENDATIONS

No further work seems warranted in this area.

PART 3

ARMSTRONG CREEK BLOCK

(Edited extract from "Report on Field Investigations Within EL 4/61, West Coast, Tasmania: Summer Field Season 1981-82. Part 1: Geochemical Programme Northern EL 4/61")

1. STREAM SEDIMENT SAMPLING

1.1 Metals

Previous stream sediment sampling in the Savage River area involved the collection of -80 mesh material from stream deposited silt banks. Unfortunately, although this method may be suitable for the detection of base metals, it is not suitable for the more erosion resistant minerals of tin, chrome, rare earth and precious metals.

Therefore, the programme was oriented towards collecting the heavy mineral portion of the sample (as a pan concentrate). In addition, a sludge (or fines) sample was collected as a more sophisticated (and reliable?) technique of obtaining a -80 mesh sample. In addition to base metals, very fine grained heavy minerals (particularly cassiterite, which is known to have a very fine grained component) are more likely to be detected in this fraction.

1.2 Method

An on the spot assessment is made of the drainage to determine the optimum sampling points (known as trapsites). Trapsites are essentially energy drop situations and are of the utmost importance in the obtaining of a correct sample. A suitable sample, in appearance, should contain all size ranges from clays and silts to large boulders.

1.3 Trapsite Criteria

In the determination of what constitutes a suitable trapsite, the following criteria (in order of decreasing desirability) are applicable:

I) Natural rock crevices in the drainage base, particularly where these oppose the water flow;
II) The downstream side of large boulders where eddy currents can be set up; and
III) Rocky creek beds, which essentially are a smaller version of II.

If at all possible, these criteria should be combined with:

i) The outwash side of a waterfall;
ii) The outer edge of the downstream side of a curve in the creek.

Sampling Technique

Once a suitable sample site was selected, the interstitial gravel was collected with a bog shovel with some boulders being moved by hand. The gravel was heaped in a 5 litre capacity prospector's panning dish to approximately 10cm. It was then worked with a little water to remove stones down to about 3cm diameter, at the same time releasing the associated fines. This thin mud was then decanted into a large plastic bag in order to settle. Where the gravel sample ceased to produce copious muddy water it was cleaned with an excess of water and panned down to produce a rough heavy mineral concentrate which was collected for laboratory examination. Normally two panning dishes provided sufficient material for the fines sample. When the mud was allowed to stand it separated out into a sand layer, a sludge layer, and a supernatent fluid of muddy water with a distinct boundary with the sludge. This fluid was carefully decanted, then the sludge layer was collected taking care to reject the sand.

Both sludge and heavy mineral concentrates were carried out in sealable plastic bags. At base the sludge was allowed to stand again, then the dense sludge was transferred to a kraft paper bag and dried. Early experimentation showed that sludge samples collected in this manner contained virtually only -80 mesh material so subsequent samples were not seived. The sample was then sent away for analysis.

Fifteen pannings per sample was initially deemed sufficient to provide an adequate heavy mineral sample. This number of pannings was determined on the basis of laboratory requirements for quantitative assessment of the sample if required.

Where only minor drainages or limited sample material zones were selected for sampling, three pan samples were taken. However, towards the end of the field season, it became apparent that three pan sample generally provide sufficient material for identification and correlation with other samples. Consequently, all subsequent samples were taken this way.

In the panning process, a quantity of quartz was retained in the pan concentrate. This is unavoidable as some of the heavy minerals have a specific gravity not greatly in excess of that of quartz, and so, to prevent loss of these, some quartz (and light material) was retained.

This quartz is currently being removed by heavy media separation (tetrabromoethane) and then the heavy mineral concentrate will be re-examined, and analysed if required. A brief field examination is made on the spot and notes made if required (e.g. if gold is present, etc).

Elements	Analytical Technique	Code
Cu,Pb,Zn, Ag,Ni,Co,Bi (5)(5)(5)(.5)(5)(5)(5)	Preparation by perchloric acid digestion and analysis by atomic absorption spectrophotometry (5) denotes detection limit claimed in parts per million.	101
Mo (2)	X-ray Fluorescence Spectroscopy	102
As (1)	Vapour hydride generation A.A.S.	114
Ba (stream sediments (5) HM 5-180)	Special acid digestion A.A.S.	120
Ba (Soil and stream (10) sediments HM 181-306)	X-ray Fluorescence Spectroscopy	401
Au (0.032) or (0.1)	Aqua Regia Digestion	301
W, Te, Sb (10) (3) (3)	X-ray Fluorescence Spectroscopy	401
Sn (3)	X-ray Fluorescence Spectroscopy	402

On one particular area of interest, the Waterfall Creek Magnetic Anomaly, AMDEL Laboratory Services were utilised (see table below).

Elements	Analytical Technique	Code
Cu, Zn, Co, N (2) (2) (5) (5)	Perchloric Acid digestion and A.A.S. (2) denotes detection limit claimed	C1/C2
Au (0.05)	Aqua regia digestion and A.A.S.	C3/1
Ba, As,Pb, Bi,Sn,U (10)(2)(2)(4)(4)(10)	X-ray Fluorescence	B/3

In conjunction with the stream sediment programme, 297 heavy mineral concentrates were also collected. At the time of writing, Analabs are conducting heavy mineral separations on the samples (code 1610).

Special Analytical methods used include: -

- Mineral scan by X-ray diffraction, Code 1650 (Samples HM 35, 36, 65, 66, 68)

- Qualitative examination of heavy mineral grain concentrates, Code 1615 (HM 7)

1.5 Alford's Creek

At first it was thought that this area might contain an osmiridium bearing deep lead but no osmiridium was found. Heavy minerals found resembled those from Brown Plains, ie, mature sediments with inputs including the granite and serpentinite terrains.

An interesting outcrop occurs 50 m from the culvert where a cutting exposed nearly 10m in section of an arkosic sand and fine gravel, almost certainly the "granite wash at Big Creek" reported by Twelvetrees (1903) in which he also found traces of tin ore (not confirmed in our own work), but both creek samples and the granite wash outcrop were anomalous in arsenic.

Sample Number	As ppm
H.M. 11	80
H.M. 12	25 (granite wash)
H.M. 17	70

The position of the gravel makes it impossible for it to be part of a sheet deposit and if it were a valley fill it would be unlikely to be so fine grained (unless perhaps ponding had occurred). An interesting possibility is that it is actually a fill of a sinkhole collapse feature similar to those containing fills of Cambrian or Cretaceous sands in McArthur group rocks in the Borroloola region, Northern Territory.

The arsenic values may be significant but interpretation depends on clarifying the origins of the sedimentary body. The base of this is not exposed and it may require a detailed cross section by power auger. Further, the relationship between this and the upper end of Alford's Creek should be established. In addition, a single line soil sampling traverse could be conducted to test the possibility of a bedrock origin of the arsenic anomalism.

PART 4

WHYTE RIVER BLOCK

(Edited extract from "Report on Field Investigations Within Exploration Licence 4/61, West Coast, Tasmania: Summer Field Season 1984-85")

1. STREAM SEDIMENT SAMPLING

1.1 Metals

Previous stream sediment sampling in the Savage River area involved the collection of -80 mesh material from stream deposited silt banks. Unfortunately, although this method may be suitable for the detection of base metals, it is not suitable for the more erosion resistant minerals of tin, chrome, rare earth and precious metals.

Therefore, the programme was oriented towards collecting the heavy mineral portion of the sample (as a pan concentrate). In addition, a sludge (or fines) sample was collected as a more sophisticated (and reliable?) technique of obtaining a -80 mesh sample. In addition to base metals, very fine grained heavy minerals (particularly cassiterite, which is known to have a very fine grained component) are more likely to be detected in this fraction.

Method

An on the spot assessment is made of the drainage to determine the optimum sampling points (known as trapsites). Trapsites are essentially energy drop situations and are of the utmost importance in the obtaining of a correct sample. A suitable sample, in appearance, should contain all size ranges from clays and silts to large boulders.

Trapsite Criteria

In the determination of what constitutes a suitable trapsite, the following criteria (in order of decreasing desirability) are applicable:

I) Natural rock crevices in the drainage base, particularly where these oppose the water flow;
II) The downstream side of large boulders where eddy currents can be set up; and
III) Rocky creek beds, which essentially are a smaller version of II.

If at all possible, these criteria should be combined with:

i) The outwash side of a waterfall;
ii) The outer edge of the downstream side of a curve in the creek.

Sampling Technique

Once a suitable sample site was selected, the interstitial gravel was collected with a bog shovel with some boulders being moved by hand. The gravel was heaped in a 5 litre capacity prospector's panning dish to approximately 10cm. It was then worked with a little water to remove stones down to about 3cm diameter, at the same time releasing the associated fines. This thin mud was then decanted into a large plastic bag in order to settle. Where the gravel sample ceased to produce copious muddy water it was cleaned with an excess of water and panned down to produce a rough heavy mineral concentrate which was collected for laboratory examination. Normally two panning dishes provided sufficient material for the fines sample. When the mud was allowed to stand it separated out into a sand layer, a sludge layer, and a supernatent fluid of muddy water with a distinct boundary with the sludge. This fluid was carefully decanted, then the sludge layer was collected taking care to reject the sand.

Both sludge and heavy mineral concentrates were carried out in sealable plastic bags. At base the sludge was allowed to stand again, then the dense sludge was transferred to a kraft paper bag and dried. Early experimentation showed that sludge samples collected in this manner contained virtually only -80 mesh material so subsequent samples were not seived. The sample was then sent away for analysis.

Fifteen pannings per sample was initially deemed sufficient to provide an adequate heavy mineral sample. This number of pannings was determined on the basis of laboratory requirements for quantitative assessment of the sample if required.

Where only minor drainages or limited sample material zones were selected for sampling, three pan samples were taken. However, towards the end of the field season, it became apparent that three pan sample generally provide sufficient material for identification and correlation with other samples. Consequently, all subsequent samples were taken this way.

In the panning process, a quantity of quartz was retained in the pan concentrate. This is unavoidable as some of the heavy minerals have a specific gravity not greatly in excess of that of quartz, and so, to prevent loss of these, some quartz (and light material) was retained.

This quartz is currently being removed by heavy media separation (tetrabromoethane) and then the heavy mineral concentrate will be re-examined, and analysed if required. A brief field examination is made on the spot and notes made if required (e.g. if gold is present, etc).

Elements	Analytical Technique	Code
Cu,Pb,Zn, Ag,Ni,Co,Bi (5)(5)(5)(.5)(5)(5)(5)	Preparation by perchloric acid digestion and analysis by atomic absorption spectrophotometry (5) denotes detection limit claimed in parts per million.	101
Mo (2)	X-ray Fluorescence Spectroscopy	102
As (1)	Vapour hydride generation A.A.S.	114
Ba (stream sediments (5) HM 5-180)	Special acid digestion A.A.S.	120
Ba (Soil and stream (10) sediments HM 181-306)	X-ray Fluorescence Spectroscopy	401
Au (0.032) or (0.1)	Aqua Regia Digestion	301
W, Te, Sb (10) (3) (3)	X-ray Fluorescence Spectroscopy	401
Sn (3)	X-ray Fluorescence Spectroscopy	402

On one particular area of interest, the Waterfall Creek Magnetic Anomaly, AMDEL Laboratory Services were utilised (see table below).

Elements	Analytical Technique	Code
Cu, Zn, Co, N (2) (2) (5) (5)	Perchloric Acid digestion and A.A.S. (2) denotes detection limit claimed	C1/C2
Au (0.05)	Aqua regia digestion and A.A.S.	C3/1
Ba, As,Pb, Bi,Sn,U (10)(2)(2)(4)(4)(10)	X-ray Fluorescence	B/3

In conjunction with the stream sediment programme, 297 heavy mineral concentrates were also collected. At the time of writing, Analabs are conducting heavy mineral separations on the samples (code 1610).

Special Analytical methods used include: -

- Mineral scan by X-ray diffraction, Code 1650
  (Samples HM 35, 36, 65, 66, 68)

- Qualitative examination of heavy mineral grain concentrates, Code 1615
  (HM 7)

1.2 Meredith Magnetite Anomaly

This magnetic anomaly was originally considered as a possible tin area (earlier referred to as Tin Anomaly Area D).

One of the pan concentrates from this area contained significant pyrite (and minor pyrrhotite). However, the other samples contained mainly garnet and tourmaline (although one or two grey cassiterite crystals were noted).

Results of the analysis of the fines samples indicate low order anomalism for tin but very little else (HM 33 - Sn 6ppm, HM 35 - Sn 7ppm, HM 36 - Sn 9ppm). As yet, the pan concentrates have not been analysed and this should assist in evaluating the potential of this area.

Nevertheless, the results so far have not been encouraging and if the results of the heavy mineral analysis fail to reveal anything, then no further action would be recommended.

1.3 Whyte River Tributaries

There is a one point arsenic anomaly (HM 118 - 32ppm) in a tributary draining into the Whyte River below its junction with the Heazlewood River.

Several other tributaries in this area were sampled as a follow up to this point, including two samples further up the same creek. Unfortunately, this anomaly was not confirmed in this follow up and so is best regarded as a point anomaly. No further work is necessary at this stage.

PART 5

LUCY CREEK BLOCK

(Extract from "Report on Field Investigations within EL 4/61, West Coast, Tasmania: Summer Field Season 1981-82)

1. STREAM SEDIMENT SAMPLING

1.1 Metals

Previous stream sediment sampling in the Savage River area involved the collection of -80 mesh material from stream deposited silt banks. Unfortunately, although this method may be suitable for the detection of base metals, it is not suitable for the more erosion resistant minerals of tin, chrome, rare earth and precious metals.

Therefore, the programme was oriented towards collecting the heavy mineral portion of the sample (as a pan concentrate). In addition, a sludge (or fines) sample was collected as a more sophisticated (and reliable?) technique of obtaining a -80 mesh sample. In addition to base metals, very fine grained heavy minerals (particularly cassiterite, which is known to have a very fine grained component) are more likely to be detected in this fraction.

Method

An on the spot assessment is made of the drainage to determine the optimum sampling points (known as trapsites). Trapsites are essentially energy drop situations and are of the utmost importance in the obtaining of a correct sample. A suitable sample, in appearance, should contain all size ranges from clays and silts to large boulders.

Trapsite Criteria

In the determination of what constitutes a suitable trapsite, the following criteria (in order of decreasing desirability) are applicable:

I) Natural rock crevices in the drainage base, particularly where these oppose the water flow;
II) The downstream side of large boulders where eddy currents can be set up; and
III) Rocky creek beds, which essentially are a smaller version of II.

If at all possible, these criteria should be combined with:

i) The outwash side of a waterfall;
ii) The outer edge of the downstream side of a curve in the creek.

Sampling Technique

Once a suitable sample site was selected, the interstitial gravel was collected with a bog shovel with some boulders being moved by hand. The gravel was heaped in a 5 litre capacity prospector's panning dish to approximately 10cm. It was then worked with a little water to remove stones down to about 3cm diameter, at the same time releasing the associated fines. This thin mud was then decanted into a large plastic bag in order to settle. Where the gravel sample ceased to produce copious muddy water it was cleaned with an excess of water and panned down to produce a rough heavy mineral concentrate which was collected for laboratory examination. Normally two panning dishes provided sufficient material for the fines sample. When the mud was allowed to stand it separated out into a sand layer, a sludge layer, and a supernatent fluid of muddy water with a distinct boundary with the sludge. This fluid was carefully decanted, then the sludge layer was collected taking care to reject the sand.

Both sludge and heavy mineral concentrates were carried out in sealable plastic bags. At base the sludge was allowed to stand again, then the dense sludge was transferred to a kraft paper bag and dried. Early experimentation showed that sludge samples collected in this manner contained virtually only -80 mesh material so subsequent samples were not seived. The sample was then sent away for analysis.

Fifteen pannings per sample was initially deemed sufficient to provide an adequate heavy mineral sample. This number of pannings was determined on the basis of laboratory requirements for quantitative assessment of the sample if required.

Where only minor drainages or limited sample material zones were selected for sampling, three pan samples were taken. However, towards the end of the field season, it became apparent that three pan sample generally provide sufficient material for identification and correlation with other samples. Consequently, all subsequent samples were taken this way.

In the panning process, a quantity of quartz was retained in the pan concentrate. This is unavoidable as some of the heavy minerals have a specific gravity not greatly in excess of that of quartz, and so, to prevent loss of these, some quartz (and light material) was retained. This quartz is currently being removed by heavy media separation (tetrabromoethane) and then the heavy mineral concentrate will be re-examined, and analysed if required. A brief field examination is made on the spot and notes made if required (e.g. if gold is present, etc).

Elements	Analytical Technique	Code
Cu,Pb,Zn, Ag,Ni,Co,Bi (5)(5)(5)(.5)(5)(5)(5)	Preparation by perchloric acid digestion and analysis by atomic absorption spectrophotometry (5) denotes detection limit claimed in parts per million.	101
Mo (2)	X-ray Fluorescence Spectroscopy	102
As (1)	Vapour hydride generation A.A.S.	114
Ba (stream sediments (5) HM 5-180)	Special acid digestion A.A.S.	120
Ba (Soil and stream (10) sediments HM 181-306)	X-ray Fluorescence Spectroscopy	401
Au (0.032) or (0.1)	Aqua Regia Digestion	301
W, Te, Sb (10) (3) (3)	X-ray Fluorescence Spectroscopy	401
Sn (3)	X-ray Fluorescence Spectroscopy	402

On one particular area of interest, the Waterfall Creek Magnetic Anomaly, AMDEL Laboratory Services were utilised (see table below).

Elements	Analytical Technique	Code
Cu, Zn, Co, N (2) (2) (5) (5)	Perchloric Acid digestion and A.A.S. (2) denotes detection limit claimed	C1/C2
Au (0.05)	Aqua regia digestion and A.A.S.	C3/1
Ba, As,Pb, Bi,Sn,U (10)(2)(2)(4)(4)(10)	X-ray Fluorescence	B/3

In conjunction with the stream sediment programme, 297 heavy mineral concentrates were also collected. At the time of writing, Analabs are conducting heavy mineral separations on the samples (code 1610).

Special Analytical methods used include: -

- Mineral scan by X-ray diffraction, Code 1650
  (Samples HM 35, 36, 65, 66, 68)

- Qualitative examination of heavy mineral grain concentrates, Code 1615
  (HM 7)

1.2 Owen Meredith and Paradise Rivers

This area was sampled by largely helicopter borne parties. Apart from the areas which are obviously enriched in magnetite, the pan concentrates contain very little heavy mineral.

Further, there is little of significance in the analyses of the fines samples. There has been a substantial coverage of this area, and any mineralisation of significance is unlikely to have been missed.

No further work is recommended at this stage.

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APPENDIX 1.1

BADGER PLAINS BLOCK

Stream Sediment Sample Data - Heavy Mineral Series
Fines Analysis Results

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

BADGER PLAINS BLOCK

Sample Number	Creek/River	Location N	Location E	Remarks
79	Tributary of Bowry Creek	97.02	46.62	Coarse creek bed
80	Bowry Creek	97.05	46.73	Rocky creek bed
83	Tributary of Savage River	00.42	45.40	" " "
84	" " " "	00.08	45.75	Coarse creek bed
93	Tributary of Bowry Creek	96.70	46.75	Gravelly creek bed
116*	Tributary of McAuliffe Creek	11.71	49.02	Rocky creek bed
117*	McAuliffe Creek	11.60	48.93	" " "
119*	Tributary of Chinamans Creek	93.98	46.98	Gravelly creek bed
120*	Donelly Creek	93.67	46.78	Rocky creek bed
128	Tributary of Savage River	97.15	45.60	" " "
LSD12 194 *	Tributary of Little Savage River	07.18	47.72	Rocky creek bed
LSD13 195 *	" " " "	06.96	47.87	Gravelly creek bed
LSD17 244 *	Tributary of Little Savage Creek	02.45	46.15	" " "
LSD18 245 *	Savage Creek above junction of creek & 244	02.35	46.05	Rocky creek bed (some gold)
LSD19 246 *	Tributary of Little Savage Creek	02.80	45.75	Gravelly creek bed gold & silver mineral
LSD20 247 *	" " " "	02.75	45.65	Gravelly ck bed(gold)
LSD21 248 *	Savage Creek below junction 249	02.85	45.60	Rocky creek bed
LSD22 249 *	Tributary of Little Savage Creek	03.00	45.45	Gravelly creek bed
LSD23 250 *	" " " "	03.00	45.20	" " "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

BADGER PLAINS BLOCK

Sample Number	ELEMENT (PPM) Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	Remarks
79	50	5	65	x		40			4	35	130	IS			Magnetite
80	70	15	110	x		40		0.1	4	60	70	IS			Magnetite/minor gold
83	95	10	130	x		75			1	45	200	IS			Magnetite
84	85	30	115	x		60			2	40	115	IS			Magnetite
93	95	20	155	x		75			x	60	160	IS			magnetite
116	90	x	140	x		110			5	55	125	x		.025	magnetite/haematite
117	95	x	160	x		135			5	65	225	x		.006	
119	60	x	185	x		50			2	20	60	x		.002	very minor gold
120	105	10	130	x		60			3	50	45	x		.015	minor gold
128	55	x	115	x		45			4	35	75	x		.002	magnetite, epidote
194	50	15	130	x		150			4	65	104		x	.004	
195	55	15	80	x		60			6	25	762		x	.016	
244	15	10	75	x	x	25			x	10	37		x	.004	Minor gold
245	35	15	140	x	x	65			4	30	227		x	.003	
246	25	15	95	x	x	45			1	20	140		x	.003	
247	45	10	155	x	x	55			16	25	307		x	.004	Gold, osmiridium
248	20	5	70	x	x	60			2	35	222		x	.006	Gold
249	20	15	45	x	x	35			6	20	187		x	.002	
250	15	5	65	x	x	6			3	30	172		x	.007	

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

BADGER CREEK BLOCK (cont'd)

Sample Number	Creek/River	Location N	Location E	Remarks
LSD24 251 *	Tributary of Little Savage River	02.70	45.10	Gravelly creek bed
LSD25 252 *	Savage Creek	02.50	45.00	Rocky creek bed
253 *	Tributary of Savage River (South of Battys Bend track)	95.30	45.60	Gravelly creek bed
260 *	Tributary of Savage River (North of Battys Bend track)	94.80	46.95	Gravelly creek bed (some gold)
274 *	Bracken Creek (Headwaters)	94.30	46.45	Sand/gravel creek bed
282 *	Tributary of Bowry Creek (Nth of Battys Bend Track)	95.40	46.35	Gravelly creek bed
283 *	" " "	95.45	46.40	" " "
284 *	" " "	95.20	46.55	" " "
285 *	Tributary of Savage River (Sth of Battys Bend track)	94.80	46.10	" " "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

BADGER CREEK BLOCK (cont'd)

Sample Number	ELEMENT (PPM)														Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
251	30	5	100	x	x	90			2	40	145		x	.006	
252	40	10	130	x	12	130			4	55	247		x	.010	
253	50	x	65	x	x	30			1	25	123		x	.027	Magnetite, epidote, gold
260	65	10	130	x	x	90			x	50	390		x	.010	
274	30	x	45	x	x	20			x	10	40		x	.003	
282	65	10	180	x	–	60			1	45	266		x	.005	
283	50	15	100	x	–	35			1	45	163		x	.004	
284	20	5	80	x	–	40			1	30	256		x	.005	
285	10	5	25	x	–	20			1	15	79		x	.006	

All readings in p.p.m. unless otherwise stated.

x = element concentration is below limit of detection.

– = element not determined.

APPENDIX 1.2

BADGER PLAINS BLOCK

WATERFALL CREEK MAGNETIC ANOMALY SERIES

(From Amdel Report 3380/84)

SOIL SAMPLE DATA
WATERFALL CREEK MAGNETIC ANOMALY SERIES

BADGER PLAINS BLOCK

(From Amdel Report - 3380/84)

Location		Elements (ppm)											Remarks
North	East	Cu	Pb	Zn	As	Co	Sn	W	Bi	Ni	Ba	Au	
00.30	45350	56	<2	110	<2	46	<4	10	4	86	740	<.05	
	45325	250	<2	76	3	40	4	<10	4	76	210	<.05	
	45300	16	<2	66	2	16	10	10	<4	50	980	<.05	
	45275	80	<2	60	3	20	<4	10	<4	46	470	<.05	
	45250	220	<2	120	2	70	4	<10	4	96	120	<.05	
	45225	150	<2	38	16	10	4	<10	<4	40	250	<.05	
	45200	210	<2	70	15	20	<4	15	<4	86	230	<.05	
	45175	340	<2	86	16	30	<4	<10	<4	120	130	<.05	
	45150												Quartz gravels
	45125												No samples
	45100												taken.
	45075												"
	45050												"
	45025												"
00.10	44850	100	<2	66	4	26	4	15	<4	86	45	<.05	
	44875	60	<2	50	4	20	6	10	<4	70	45	<.05	
	44900	80	<2	50	6	20	<4	10	<4	70	990	<.05	
	44925	310	<2	96	5	190	8	<10	4	110	170	<.05	
	44950	38	<2	36	10	10	8	<10	<4	20	430	<.05	
	44975	56	<2	100	28	10	<4	10	<4	66	370	<.05	
	45000	120	11	80	13	36	4	20	<4	90	980	0.20	
	45025	150	<2	100	4	56	14	10	<4	100	550	<.05	
	45050	510	<2	46	38	26	4	<10	<4	60	140	<.05	
	45075	460	<2	130	6	70	10	<10	4	160	190	<.05	
	45100	200	<2	100	<2	100	4	<10	4	100	75	<.05	

SOIL SAMPLE DATA
WATERFALL CREEK MAGNETIC ANOMALY SERIES (cont'd)

BADGER PLAINS BLOCK

Location		Elements (ppm)											Remarks
North	East	Cu	Pb	Zn	As	Co	Sn	W	Bi	Ni	Ba	Au	
00.10	45125	140	6	48	<2	56	<4	15	<4	56	350	<.05	
	45150	200	<2	90	4	56	6	<10	<4	80	180	<.05	
	45175	76	<2	86	2	30	<4	10	<4	56	760	<.05	
	45200	110	<2	60	3	20	8	10	4	40	210	<.05	
	45225	96	12	60	4	20	8	15	<4	40	230	<.05	
	45250	140	2	66	2	20	4	10	<4	56	220	<.05	
	45275	180	<2	120	<2	70	<4	10	<4	76	170	<.05	
	45300	66	6	36	2	6	<4	15	<4	40	450	<.05	
	45350	12	<2	70	<2	36	4	<10	<4	56	300	<.05	
	45400	66	<2	96	<2	46	<4	15	<4	66	470	<.05	
	45450	26	8	60	2	100	<4	10	<4	50	370	<.05	
	45500	110	5	36	<2	36	6	10	<4	36	340	<.05	
	45550	120	15	96	<2	26	<4	<10	<4	66	350	<.05	
	45600	110	3	22	<2	10	4	10	<4	36	260	<.05	
	45650	48	<2	40	<2	26	4	10	4	100	190	<.05	
99.90	44800	100	<2	100	5	30	6	10	<4	96	630	<.05	
	44825	110	<2	86	22	30	<4	<10	<4	140	410	<.05	
	44850	86	<2	80	11	110	4	<10	4	140	450	<.05	
	44875	110	<2	110	<2	76	8	<10	<4	240	120	<.05	
	44900	210	<2	60	<2	140	6	15	<4	76	55	<.05	
	44925	200	<2	110	<2	20	<4	<10	<4	76	60	<.05	
	44950	220	<2	130	<2	56	6	10	<4	90	80	<.05	
	44975	86	<2	16	2	340	4	15	<4	40	140	<.05	
	45000	86	<2	48	6	36	<4	<10	<4	100	280	<.05	
	45025	140	<2	70	27	16	6	10	4	110	520	<.05	

SOIL SAMPLE DATA
WATERFALL CREEK MAGNETIC ANOMALY SERIES

BADGER PLAINS BLOCK

Location		Elements (ppm)											Remarks
North	East	Cu	Pb	Zn	As	Co	Sn	W	Bi	Ni	Ba	Au	
99.90	45050	180	<2	130	28	50	6	10	<4	110	160	<.05	
	45075	120	<2	100	4	76	<4	10	<4	86	140	<.05	
	45100	20	<2	34	3	10	6	10	4	30	270	<.05	
99.925	45000	140	<2	46	9	36	<4	<10	<4	46	450	<.05	
99.950		490	<2	48	7	10	4	<10	<4	66	250	<.05	
99.975		90	<2	46	<2	60	<4	<10	<4	100	85	<.05	
00.000		250	<2	76	<2	80	<4	10	<4	66	440	<.05	
00.025		170	<2	130	<2	96	6	10	<4	130	110	<.05	
00.050		96	<2	76	11	30	<4	10	<4	96	240	<.05	
00.075		86	13	80	11	30	<4	<10	<4	110	740	<.05	
00.100		120	11	80	13	36	4	<20	<4	90	980	0.20	anomalous Au sample
00.125		120	<2	100	16	96	4	<10	<4	130	780	<.05	
00.150		140	8	100	10	36	8	<10	<4	86	890	<.05	
00.175		46	<2	80	22	10	8	<10	<4	70	610	<.05	
00.200		34	<2	46	<2	30	4	<10	<4	70	600	<.05	rock chip sample
00.225		12	<2	42	<2	26	<4	<10	<4	90	600	<.05	
00.250													Quartz gravels
00.275													No sample
00.300													taken.

APPENDIX 1.3

BADGER PLAINS BLOCK

STREAM SEDIMENT SAMPLE DATA - DIAMOND SERIES

Analytical Report Number

Diamond Laboratory Services Pty. Ltd. Reports:
Laboratory Reference No. - AA 15650 - 19 April 1984
Laboratory Reference No. - AA 15697 - 28 June 1984

063

233064 A1.3.2

Diamond Laboratory Services Pty. Ltd.

HEAVY MINERAL DIVISION
Australian Representative for:

DIAMOND GRADING LABORATORIES

3rd Floor
89 York Street
Sydney, N.S.W. 2000
Telephone (02) 290 1022

DUPLICATE

HEAVY MINERAL CONCENTRATE ANALYSIS

EXAMINATION FOR KIMBERLITIC MINERAL INDICATOR GRAINS

CONSIGNMENT (Lab. Ref. No.):	AA 15650
CLIENT:	INDUSTRIAL AND MINING INVESTIGATIONS P/L.
SAMPLE NUMBER (Client's Ref.):	LSD 7, LSD 18, LSD 26.
TOTAL NUMBER OF SAMPLES:	THREE
DATE SAMPLES RECEIVED:	4.4.84
DATE SAMPLES COMPLETED:	12.4.84

The above consignment has been sorted and checked and the results tabulated on the accompanying sheets.

Key to symbols used in the report:

	Etched
l.abr.	Lightly abraded
abr.	Abraded
R.O.S.	Remnant of original surface
R.O.K.	Remnant of kelyphitic surface
	Diamonds
N.K.	Non-kimberlitic
	Angular

19.4.84

....

Laboratory Supervisor Date

RESULTS AND DISCUSSION

Samples LSD 7, 18, 26

Each of the samples was found to be abundant in black grains whose appearance suggests chromite and therefore warrant further investigation.

A representative number of these grains have been sent for further investigation by electron microprobe analysis to determine their composition.

In addition to these grains the samples contained grains of non-kimberlitic garnets, topaz, tourmaline, zircon, cassiterite, pyroxene and gold.

Silvery grey metallic grains were also noticed in samples LSD 18 and LSD 26 which are thought to be an alloy of the platinum group of metals.

The results are tabled on the following page.

Representative grains of the minerals listed are available for inspection if required.

CONCENTRATION OF RAW SAMPLES

The concentrate from each of these samples was small in relation to the size of the raw samples.

Therefore, a substantial saving of transport and establishment of concentrate costs could be made if the samples are washed and partially concentrated before shipping to Sydney.

However, because of the size of the concentrate, especially in the -1mm. size fraction, extreme care should be exercised in the initial concentrating steps to avoid loss of these important grains.

Only partial concentration is therefore recommended with a cut-off point which allows plenty of margin for error.

19.4.84.

065

DUPLICATE

METHOD OF EXAMINATION

Three samples numbered LSD 7, LSD 18 and LSD 26 were received for inspection.

The processing and visual inspection of all samples was carried out at the Sydney premises of Diamond Laboratory Services Pty. Ltd.

Each of the samples was screened and processed using all steps required to produce a heavy mineral concentrate for observation.

As none of the samples had not undergone any preparation, the steps required after the initial weight was recorded involved washing and screening and heavy media separation using bromoform as the flotation medium. The heavy mineral fraction of each sample was sieved into the following fractions:

+16 mesh	:	coarse fraction
+25 mesh	:	medium fraction
+44 mesh	:	fine fraction
-44 mesh	:	extra fine fraction

No further work was performed on the light float which was discarded, nor was the extra fine fraction inspected at this stage.

Visual inspection of the concentrates was carried out by qualified sorters using stereomicroscopes. Each sample was examined grain by grain for traces of kimberlitic indicator minerals.

Grains considered to have morphological characteristics consistent with kimberlitic indicator minerals were isolated and sent for further confirmatory analysis.

Other grains of interest recognised by our sorters are listed in the 'Other Grains' column and may include the following: moissanite, fluorite, pyroxene, olivine, zircon, tourmaline, kyanite, corundum, rutile, haematite, cassiterite, mica, pyrites, gold, bronzite, etc.

Representative samples of all grains listed in the following pages as present in these samples are available for further inspection if needed.

19.4.84.

090

233067 A1.3.5

Diamond Laboratory Services Pty. Ltd.

HEAVY MINERALS DIVISION

3rd Floor
89 York Street
Sydney, N.S.W. 2000
Telephone (02) 290 1022

CONSIGNMENT AA.15650.... SAMPLE No's. LSD-7.:LSD-18:LSD-26.... DATE 12.4.84.......

Sample No.	Mesh Size	Garnet	Ilmenite	Chrome Diopside	Spinel	Other Grains	Remarks
LSD 7	+16	1 N.K.	—	—	10	20 Topaz. 1 Tourmaline.	
	+25	5 N.K.	—	—	20	Abundant Topaz. 1 Zircon: 4 Tourmaline.	
	+44	10 N.K.	—	—	Abundant	Abundant Topaz: 1 Cassiterite: 1 Gold: 2 Pyroxene: 10 Tourmaline.	
	+60	—	—	—	—	—	
LSD 18	+16	3 N.K.	—	—	10	1 Tourmaline: 10 Topaz.	
	+25	12 N.K.	—	—	Abundant	AB. Topaz: 5 Haematite: 2 Gold: 10 Tourmaline.	
	+44	26 N.K.	—	—	Abundant	AB. Topaz: 6 Haematite: 4 Zircons: 5 Cassiterite: 2 Rutile: 6 Gold: 10 Tourmaline. 3 Pyroxene:	1 Metallic Silvery Nugget.
	+60	—	—	—	—	—	
LSD 26	+16	3 N.K.	—	—	15	1 Haematite. 1 Gold: 10 Topaz.	
	+25	13 N.K.	—	—	Abundant	7 Gold: 10 Haematite: 20 Pyroxene: AB. Topaz.	1 Metallic Silvery Nugget.
	+44	28 N.K.	—	—	Abundant.	20 Haematite: 25 Pyroxene: 10 Gold: 1 Cassiterite: AB. Topaz.	2 Metallic Silvery Nuggets
	+60	—	—	—	—	—	
	+16						
	+25						
	+44						
	+60						
	+16						
	+25						
	+44						
	+60						
	+16						
	+25						
	+44						
	+60						

SAMPLES RECEIVED IN LAB ....4.4.84...... SAMPLES SEPARATED .....4.4.84..........

067

DUPLICATE

METHOD OF EXAMINATION

Three samples numbered LSD 7, LSD 18 and LSD 26 were received for inspection.

The processing and visual inspection of all samples was carried out at the Sydney premises of Diamond Laboratory Services Pty. Ltd.

Each of the samples was screened and processed using all steps required to produce a heavy mineral concentrate for observation.

As none of the samples had not undergone any preparation, the steps required after the initial weight was recorded involved washing and screening and heavy media separation using bromoform as the flotation medium. The heavy mineral fraction of each sample was sieved into the following fractions:

+16 mesh	:	coarse fraction
+25 mesh	:	medium fraction
+44 mesh	:	fine fraction
-44 mesh	:	extra fine fraction

No further work was performed on the light float which was discarded, nor was the extra fine fraction inspected at this stage.

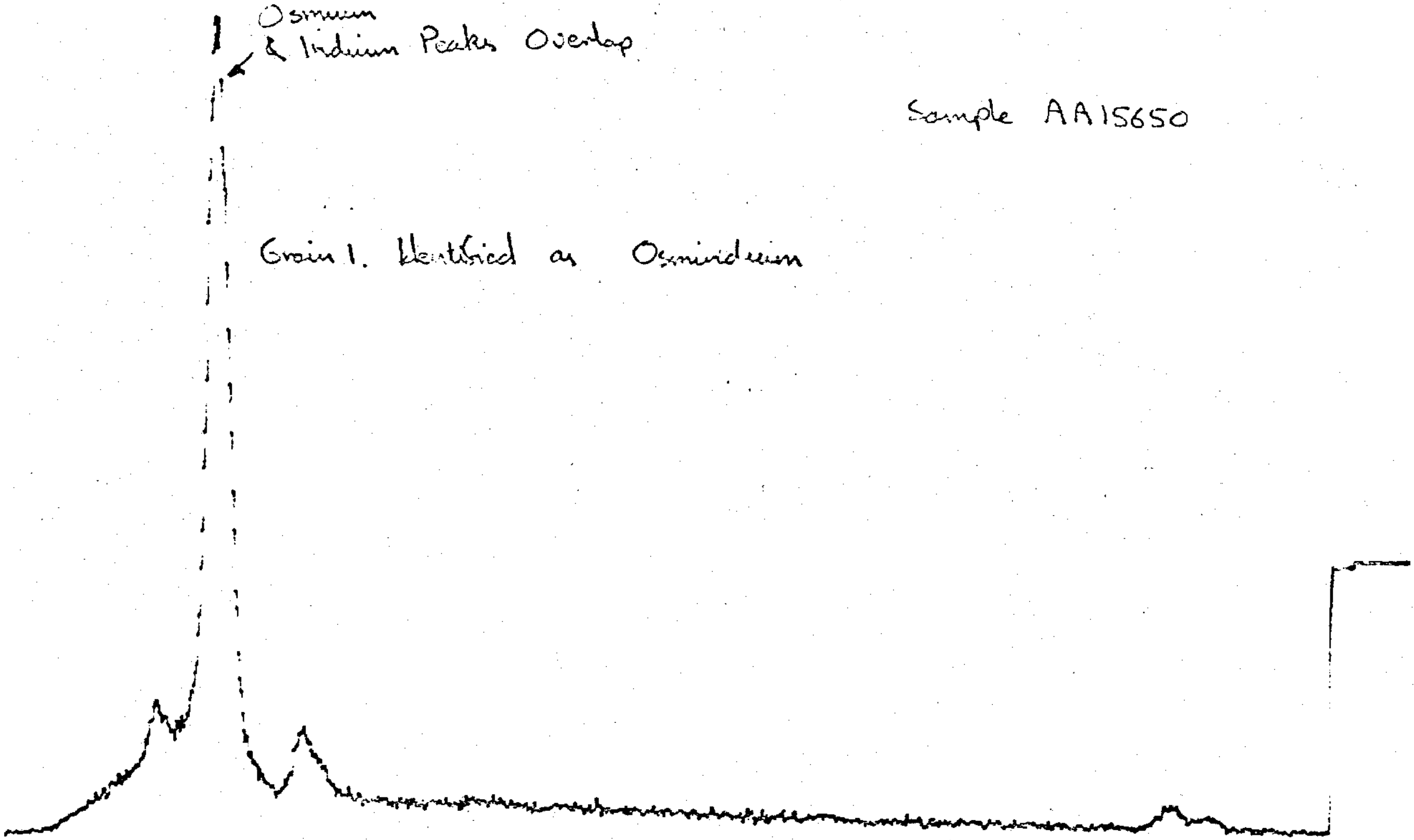
Visual inspection of the concentrates was carried out by qualified sorters using stereomicroscopes. Each sample was examined grain by grain for traces of kimberlitic indicator minerals.

Grains considered to have morphological characteristics consistent with kimberlitic indicator minerals were isolated and sent for further confirmatory analysis.

Other grains of interest recognised by our sorters are listed in the 'Other Grains' column and may include the following: moissanite, fluorite, pyroxene, olivine, zircon, tourmaline, kyanite, corundum, rutile, haematite, cassiterite, mica, pyrites, gold, bronzite, etc.

Representative samples of all grains listed in the following pages as present in these samples are available for further inspection if needed.

19.4.84.



To Be Annexed to Report No 15650.
2.7.84.

233069

A1.3.7

069

233070 A1.3.8

GRAIN 2\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIO
TIO2	.17	.16	.005	.004
AL2O3	59.14	58.57	2.662	2.359
CR2O3	9.91	9.82	.299	.265
FEO	10.29	10.19	.329	.291
MNO	.16	.16	.005	.005
MGO	21.3	21.1	1.213	1.075
TOTAL	100.97	100	4.513	5.316

MG:FE .786641 : .213359

CA:NA:K 0 : 0 : 0

CA:MG:FE 0 : 78.6641 : 21.3359

0 0 .17 59.14 0 9.91 10.29 0

.16 21.3 0 0 0 0 100.97

2129 24902 71617 2763 2229 1985 1708 1592

1299 1038 6297 1648 5056 640 3029 1950

SELECT E.D.S. ROUTINE? GRAIN 3\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATION
AL2O3	60.43	60.02	2.715	2.409
CR2O3	8.82	8.76	.266	.236
FEO	10.31	10.24	.329	.292
MNO	.09	.09	.003	.003
MGO	21.03	20.89	1.195	1.061
TOTAL	100.68	100	4.508	5.323

MG:FE .784121 : .215879

CA:NA:K 0 : 0 : 0

CA:MG:FE 0 : 78.4121 : 21.5879

0 0 0 60.43 0 8.82 10.31 0

.09 21.03 0 0 0 0 100.68

2046 24779 73404 2669 2108 2086 1697 1520

1137 1031 5709 1538 5067 638 3097 1877

SELECT E.D.S. ROUTINE? GRAIN 4\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
TIO2	.1	.1	.003	.002
AL2O3	56.6	56.3	2.6	2.307
CR2O3	12.17	12.11	.375	.333
FEO	11.93	11.87	.389	.345
MNO	.27	.27	.009	.008
MGO	19.46	19.35	1.131	1.004
TOTAL	100.53	100	4.507	5.322

MG:FE .744079 : .255921

CA:NA:K 0 : 0 : 0

CA:MG:FE 0 : 74.4079 : 25.5921

0 0 .1 56.6 0 12.17 11.93 0

.27 19.46 0 0 0 0 100.53

070

2032 22620 28568 2776 2203 2085 1831 1630
1278 1162 7569 1882 5771 650 3100 1952
SELECT E.D.S. ROUTINE? GRAIN 5\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
SIO2	.1	.1	.004	.004
TIO2	.15	.14	.005	.004
AL2O3	31.12	30.53	1.577	1.387
CR2O3	38.41	37.68	1.306	1.149
FEO	13.92	13.65	.501	.441
NIO	.13	.13	.004	.004
MNO	.41	.4	.015	.013
MGO	17.71	17.37	1.136	.999
TOTAL	101.95	100	4.548	5.277

MG:FE .693952 : .306048
CA:NA:K 0 : 0 : 0
CA:MG:FE 0 : 69.3952 : 30.6048
0 .1 .15 31.12 0 38.41 13.92 .13
.41 17.71 0 0 0 0 101.95

1844 18763 37527 3339 2647 2401 2051 1953
1478 1391 22420 4005 6779 750 3443 2413
SELECT E.D.S. ROUTINE? GRAIN 6\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
TIO2	.18	.18	.007	.006
AL2O3	5.39	5.34	.32	.284
CR2O3	66.83	66.15	2.657	2.361
FEO	18.18	17.99	.765	.68
MNO	.94	.93	.04	.036
MGO	9.51	9.41	.713	.634
TOTAL	101.03	100	4.502	5.329

MG:FE .482409 : .517591
CA:NA:K 0 : 0 : 0
CA:MG:FE 0 : 48.2409 : 51.7591
0 0 .18 5.39 0 66.83 18.18 0
.94 9.51 0 0 0 0 101.03

1609 10262 9186 3838 3266 2924 2480 2388
1762 1660 39700 6731 8913 822 4068 2957
SELECT E.D.S. ROUTINE? GRAIN 7\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
TIO2	.19	.18	.007	.006
AL2O3	4.71	4.68	.279	.243
CR2O3	64.17	63.66	2.545	2.223
FEO	18.59	18.45	.781	.682
MNO	.49	.49	.021	.018
MGO	12.65	12.55	.946	.827
TOTAL	100.8	100.01	4.579	5.239

MG:FE .547771 : .452229
CA:NA:K 0 : 0 : 0
CA:MG:FE 0 : 54.7771 : 45.2229
0 0 .19 4.71 0 64.17 18.59 0
.49 12.65 0 0 0 0 100.8

```
 1636  12836  8369  3874  3107  2971  2464  2403
 1754  1527  38005  6256  9042  868  4034  2937
SELECT E.D.S. ROUTINE? GRAIN 8\? 5
OXIDE            WT% UNORM        WT% NORM         6 OXYGEN         4 CATIONS
 TIO2            .11              .11              .004             .004
AL2O3            6.28             6.25             .368             .328
CR2O3            67.57            67.22            2.651            2.365
  FEO            14.89            14.82            .618             .552
  MNO            .65              .64              .027             .024
  MGO            11.01            10.96            .815             .727

TOTAL            100.51           100              4.483            5.351
MG:FE            .568737 : .431263
CA:NA:K          0 : 0 : 0
CA:MG:FE         0 : 56.8737 : 43.1263
 0  0  .11  6.28  0  67.57  14.89  0
 .65  11.01  0  0  0  0  100.51
```

```
 1685  11603  10147  3865  3153  2809  2470  2295
 1694  1602  39949  6582  7441  813  4038  2883
SELECT E.D.S. ROUTINE? GRAIN 9\? 5
OXIDE            WT% UNORM        WT% NORM         6 OXYGEN         4 CATIONS
 TIO2            .17              .16              .006             .005
AL2O3            3.72             3.67             .22              .195
CR2O3            68.87            67.97            2.734            2.423
  FEO            16.85            16.63            .708             .627
  MNO            1                .99              .042             .038
  MGO            10.73            10.59            .803             .712

TOTAL            101.34           100.01           4.513            5.314
MG:FE            .531436 : .468564
CA:NA:K          0 : 0 : 0
CA:MG:FE         0 : 53.1436 : 46.8564
 0  0  .17  3.72  0  68.87  16.85  0
 1  10.73  0  0  0  0  101.34
```

```
 1535  11166  7275  3782  3153  2869  2418  2320
 1721  1643  40861  6894  8319  850  4021  2852
SELECT E.D.S. ROUTINE? GRAIN 10\? 5
OXIDE            WT% UNORM        WT% NORM         6 OXYGEN         4 CATIONS
 TIO2            .26              .26              .009             .008
AL2O3            15.17            15.05            .858             .756
CR2O3            53.63            53.21            2.036            1.793
  FEO            19.47            19.31            .782             .689
  MNO            .74              .73              .03              .026
  MGO            11.54            11.45            .826             .728

TOTAL            100.81           100.01           4.541            5.282
MG:FE            .513682 : .486318
CA:NA:K          0 : 0 : 0
CA:MG:FE         0 : 51.3682 : 48.6318
 0  0  .26  15.17  0  53.63  19.47  0
 .74  11.54  0  0  0  0  100.81
```

1687 12885 19800 3475 2937 2731 2364 2174
1712 1504 31630 5497 9345 828 3803 [illegible]
SELECT E.D.S. ROUTINE? GRAIN 11\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
TIO2	.18	.18	.007	.006
AL2O3	5.67	5.64	.337	.299
CR2O3	65.76	65.34	2.621	2.324
FEO	18.31	18.2	.773	.685
MNO	.97	.96	.041	.037
MGO	9.75	9.69	.733	.65
TOTAL	100.64	100.01	4.512	5.318

MG:FE .48672 : .51328
CA:NA:K 0 : 0 : 0
CA:MG:FE 0 : 48.672 : 51.328
0 0 .18 5.67 0 65.76 18.31 0
.97 9.75 0 0 0 0 100.64

1649 10476 9495 3707 3013 2981 2446 2364
1764 1622 39042 6661 8970 800 4062 2976
SELECT E.D.S. ROUTINE? GRAIN 12\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
TIO2	.13	.13	.004	.004
AL2O3	26.62	26.37	1.42	1.251
CR2O3	41.53	41.14	1.486	1.309
FEO	18.82	18.64	.713	.628
MNO	.57	.57	.022	.019
MGO	13.28	13.15	.896	.789
TOTAL	100.95	100	4.541	5.283

MG:FE .556868 : .443132
CA:NA:K 0 : 0 : 0
CA:MG:FE 0 : 55.6868 : 44.3132
0 0 .13 26.62 0 41.53 18.82 0
.57 13.28 0 0 0 0 100.95

1779 14324 32605 3363 2668 2515 2166 2074
1519 1419 24395 4391 8944 746 3537 2567
SELECT E.D.S. ROUTINE? GRAIN 13\? 5

OXIDE	WT% UNORM	WT% NORM	6 OXYGEN	4 CATIONS
TIO2	.11	.11	.004	.004
AL2O3	4.75	4.75	.283	.251
CR2O3	67.06	67.1	2.679	2.375
FEO	16.07	16.08	.68	.603
MNO	1.05	1.05	.045	.04
MGO	10.9	10.91	.822	.728
TOTAL	99.94	100	4.513	5.317

MG:FE .54727 : .45273
CA:NA:K 0 : 0 : 0
CA:MG:FE 0 : 54.727 : 45.273
0 0 .11 4.75 0 67.06 16.07 0
1.05 10.9 0 0 0 0 99.94

1589 11417 8449 3812 3120 2958 2492 2272
1700 1549 39707 6779 7983 800 3979 3017
SELECT E.D.S. ROUTINE?

VARIATION IN THE COMPOSITION OF CHROMITE FROM A NUMBER OF GEOLOGICAL ENVIRONMENTS.

Chromite (or chrome spinel) is a common accessory mineral found in all of the various rock types associated with:-

1. The ophiolite suite (ocean-floor rocks), including
   (a) Alpine - type(Metamorphic) peridotites and
   (b) Cumulate (igneous) perdotites.
2. Continental layered mafic - ultramafic intrusions.

In some cases the chromite becomes concentrated to form tabular, lens-shaped or irregular masses to form economic concentrations. Chromite deposits associated with ophiolitic rocks are known by the general term podiform chromites. Those associated with the large continental layered intrusions are known as stratiform chromites.

3. Chromite is also a very minor accessory in kimberlites where it occurs in several different ways.

Chromite variation in Podiform and Stratiform types.

The published literature does not differentiate between chromite found as an accessory mineral in the various rock types of the ophiolite suite and the continental layered complexes, and the chromite found as a major constituent in podiform and stratiform deposits. Information which can be found refers entirely to the economic occurrences of the mineral. There is no reason however, why it should not also apply within the main body of the rocks themselves.

The composition of chromite from podiform deposits is very variable because of the complicated crystallization and deformational history of most ophiolitic rocks.

In stratiform deposits on the other hand, the chemical variation is a direct reflection of the degree of fractionation of the mineral from its parent.

The Fe content of podiform chromites remains fairly constant (10-16% FeO) while in stratiform chromites Fe and Cr. show a reciprocal arrangement with Fe increasing with the degree of fractionation while Cr decreases.

Chromites from podiform deposits are typically more magnesian than those from stratiform deposits. In podiform chromites the Fe^{2+}: Mg is usually < 1 and is almost constant for and individual deposit, while in the stratiform chromites, Fe^{2+}:Mg = 0.5 - 2.5 and may vary considerably in individual deposits.

The diagram below illustrates this point.

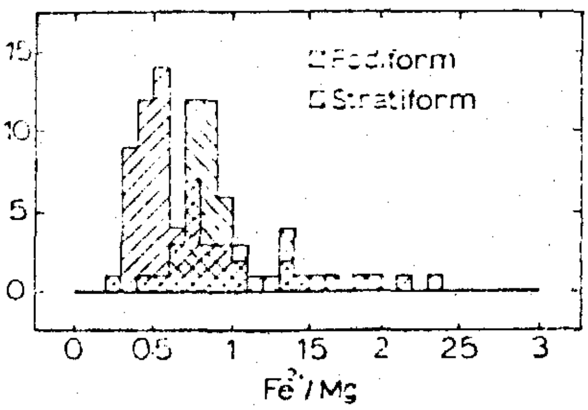


Fig. 3. Atomic ratio of Fe^{3+} vs Mg for chromites from stratiform and podiform deposits. Fe^{3+} calculated from total Fe by assuming spinel stoichiometry. Analyses by electron microprobe.

It is the reciprocal relation of Cr and Al which characterizes podiform chromites. They tend to be bimodal, concentrating into high Al and / or high Cr groups. The reason for this bimodality is not clear but may be pressure related. Nearly all high Cr and high Al chromites come from podiform deposits.

The figure below illustrates the atomic proportions of Cr, Al and Fe for chromites from podiform and stratiform intrusions.

Chromite

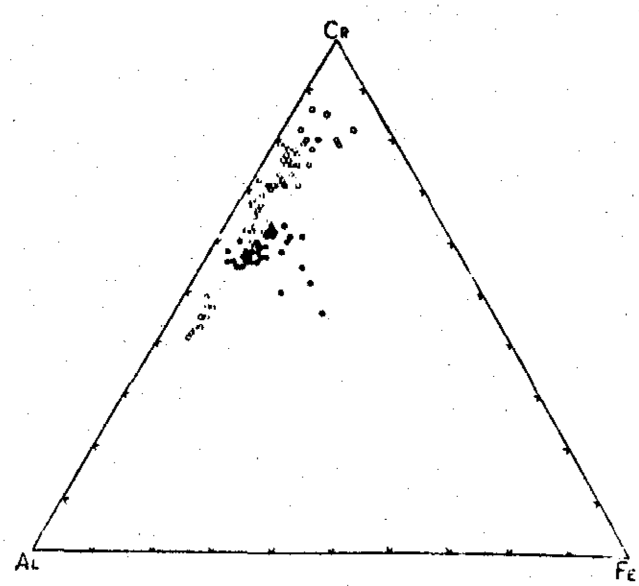


Fig. 51. Atomic proportions of Cr, Al, and Fe for chromites from stratiform intrusions *(solid circles)* and podiform deposits *(open circles)*. Fe^{3+} calculated from total Fe by assuming spinel stoichiometry and shown as Fe on diagram. Analyses by electron probe. (After Dickey, 1975)

A distinction between chromites from stratiform and podiform deposits can also be made on the basis of TiO_2 concentrations. Podiform chromites usually contain $< 0.3\%$ TiO_2 while in stratiform deposits it may range from $0.5 \rightarrow 2\%$.

In summary:

	PODIFORM	STRATIFORM
Fe^{2+}:Mg	< 1	0.5 - 2.5
FeO	Fairly constant 10-16%	Variable with differentiation, as high as 28%. Reciprocal with Cr.
Cr / Al	Reciprocal wide variation.	Fairly uniform.
TiO_2	< 1%	0.5 - 2.5%

Chromite variation in Kimberlites

There are quite large variations in the chemistry of chrome spinels found in kimberlites. This is because the mineral occurs in a variety of ways. It is more properly referred to as "Chrome spinel" rather than true chromite.

Occurrences of chrome spinel are:

1. As xenocrysts (single large crystals in rock)
2. Primary groundmass spinels.
3. Secondary spinels mantling (1) and (2).
4. Secondary spinels in garnet kelyphitic rims.
5. Secondary spinels mantling picroilmenite.
6. As exsolved inclusions in picroilmenite.

The outstanding and characteristic features of categories (1), (2) and (4) are the presence and degree of extraordinary complex zoning in the chrome spinel.

Xenocrystic chrome spinels and those mantling garnet kelyphites (categories (1) and (4)) compositionally match those chromites occurring in a wide range of peridotite inclusions in kimberlites and cover the range of podiform and stratiform types from which they cannot be distinguished except by the presence of zoning.

They were probably shed into the kimberlite during fragmentation of peridotite xenoliths.

Some primary groundmass chrome spinel, secondary mantling spinels and those exsolved from picroilmenite (categories (2),(3) (5) and (6)) tend to be much richer in TiO_2 and Fe, especially Fe^{3+}. They may contain up to 5% TiO_2, 10% Fe_3O_4 and 25% $FeAlO_4$. Their composition is not unique to kimberlites. However, the complex zoning where by up to 5 distinct and contrasting primary chrome spinels may be found together between the innermost core and outermost mantle of an individual grain is unique.

Some spinels which either mantle or exsolve from picroilmenite may contain up to 16% TiO_2 and 28% Fe_2O_3 and are unique to kimberlites. These could not be considered to be "chrome" spinels in the true sense, however.

References:

DICKEY, J.S (1975) A hypothesis of origin for podiform chromite deposits. Geochem. Cosmochim. Acta, 39 p. 1061 -1074

HAGGERTY, S.E. (1975) The chemistry and genesis of opague minerals in kimberlite.
First Internat. Kimberlite Conference. p. 295 - 307.

THAYER, T.P. (1970). Chromite segregations as petrogenetic indicators. Geol. Soc. S.Africa Spec. Publ. 1 p. 380 - 390.

077

233078 A1.3.16

Analyses of grains probed:-

Grain	2	3	4	5	6	7
Fe/Mg	0.5	0.5	0.7	0.9	2	1.5
FeO	10.	10.	12.	14.	18	18.5
Cr:Al	1:6	1:8	1:5	1:09	12:1	16:1
TiO_2	.16	-	.1	.1	.18	.18

	8	9	10	11	12	13
Fe/Mg	1.2	1.6	1.8	2.	1.5	1.6
FeO	15.	16.	19.	18.	18.5	16.
Cr/Al	11:1	22:1	4:1	13:1	2:1	16:1
TiO_2	.11	.16	.26	.18	.13	.11

Conclusions:

1. Not stratiform - because of TiO_2 content and wide variation in Cr:Al ratio.

2. Some features of podiform, except that Fe content is too variable.

3. Cannot tell whether kimberlitic or not - no unique features.

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078

233079 A1.3.17

Diamond Laboratory Services Pty. Ltd.

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HEAVY MINERAL CONCENTRATE ANALYSIS

EXAMINATION FOR KIMBERLITIC MINERAL INDICATOR GRAINS

CONSIGNMENT (Lab. Ref.No.) :	AA 15697
CLIENT:	INDUSTRIAL AND MINING INVESTIGATIONS P/L
SAMPLE NUMBER(Client's Ref.):	BATCH 1 LSD 1,2,3,4,6,8,9,10,11,14,16,20,21,24, 25,27.
TOTAL NUMBER OF SAMPLES:	SIXTEEN
DATE SAMPLES RECEIVED:	11.5.84
DATE SAMPLES COMPLETED:	20.6.84

The above consignment has been sorted and checked and the results tabulated on the accompanying sheets.

Key to symbols used in the report:

	Etched
l.abr.	Lightly abraded
abr.	Abraded
R.O.S.	Remnant of original surface
R.O.K.	Remnant of kelyphitic surface
	Diamond
N.K.	Non - kimberlitic
	Angular

28.6.84.

Laboratory Supervisor Date

METHOD OF EXAMINATION

A total of 24 samples were received for inspection in two batches of 16 samples and eight samples labelled as follows:

Batch 1 : LSD 1,2,3,4,6,8,9,10,11,14,16,20,21,24,25,27.
Batch 2 : LSD 5,12,13,15,17,19,22,23.
Samples LSD 7,18,26 had been submitted earlier for inspection in contract number AA 15650.

All of these samples had been partially concentrated by careful panning in the field to minimise initial transportation weights.

After initial weights of samples received were recorded, the final steps of preparation involving washing and screening and heavy media separation with bromoform were performed.

The heavy mineral fraction was sieved into the following size fractions:

+ 16 mesh : Coarse fraction
+ 25 mesh : Medium fraction
+ 44 mesh : Fine fraction
− 44 mesh : Extra fine fraction.

No further work was performed on the light float which was discarded.

Samples in batch 2 were not processed at all until batch 1 results were available. They are being held in storage until further notice.

Visual inspection of the concentrates was carried out by qualified sorters using stereomicroscopes. Each sample was examined grain by grain for traces of kimberlitic indicator minerals.

Grains considered to have morphological characteristics consistent with kimberlitic indicator minerals were isolated and sent for further confirmatory analysis.

../2..

Other grains of interest recognised by our sorters are listed in the 'Other Grains' column and may include the following: moissanite, fluorite, pyroxene, olivine, zircon, tourmaline, kyanite, corundum, rutile, haematite, cassiterite, mica, pyrites, gold, bronzite,etc.

Representative samples of all grains listed in the following pages as present in these samples are available for further inspection if needed.

081

233082 A1.3.20

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CONSIGNMENT AA 15697 SAMPLE No's. LSD: 1 : 2 : 3 : 4 : 6 : 8 : 9 : 10 : 11 : 14 : 16 : 20 : 21 : 24 : 25 : 27 DATE 20.6.84

Sample No.	Mesh Size	Garnet	Ilmenite	Chrome Diopside	Spinel	Other Grains	Remarks
LSD 1	+16	1 N.K.	—	—	20	20 Topaz:	
	+25	13 N.K.	—	—	25	1 Zircon: 25 Topaz: 1 Gold	
	+44	28 N.K.	—	—	30	3 Zircons: 2 Tourmaline 30 Topaz: 3 Gold: 2 Rutile	
	+60	—	—	—	—	—	
LSD 2	+16	—	—	—	—	—	
	+25	4 N.K.	—	—	10	1 Zircon: 1 Gold: 15 Topaz.	
	+44	30 N.K.	—	—	20	2 Rutile: 4 Gold: 25 Topaz. 3 Pyroxene: 10 Zircons.	
	+60	—	—	—	—	—	
LSD 3	+16	6 N.K.	—	—	5	1 Gold: 10 Topaz.	
	+25	10 N.K.	—	—	10	1 Gold: 20 Topaz.	
	+44	15 N.K.	—	—	15	2 Rutile: 2 Cassiterite: 5 Gold: 25 Topaz:	
	+60	—	—	—	—	—	
LSD 4	+16	3 N.K.	—	—	5	5 Topaz.	
	+25	4 N.K.	—	—	10	2 Pyroxene: 2 Zircons: 10 Topaz.	
	+44	6 N.K.	—	—	15	16 Pyroxene: 3 Zircons: 15 Topaz:	
	+60	—	—	—	—	—	
LSD 6	+16	—	—	—	20	3 Topaz:	
	+25	6 N.K.	—	—	25	5 Topaz: 1 Gold: 10 Zircons	
	+44	20 N.K.	—	—	30	3 Tourmaline 10 Topaz: 10 Zircons: 1 Gold	
	+60	—	—	—	—	—	
LSD 8	+16	3 N.K.	—	—	1	1 Zircon: 10 Topaz.	
	+25	4 N.K.	—	—	6	1 Zircon: 10 Topaz.	
	+44	16 N.K.	—	—	10	2 Tourmaline: 1 Zircon: 1 Rutile: 1 Cassiterite:	
	+60	—	—	—	—	—	

SAMPLES RECEIVED IN LAB 11.5.84 SAMPLES SEPARATED 11.5.84

SAMPLES UNPACKED AND CHECKED 11.5.84 SLIDES CHECKED 20.6.84

082

233083 A1.3.21

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LSD:- 1: 2: 3: 4: 6: 8: 9: 10: 11: 14: 16: 20: 21: 24: 25: 27.

CONSIGNMENT ..AA 15697.. SAMPLE No's. ..21: 24: 25: 27.......... DATE 20.6.84......

Sample No.	Mesh Size	Garnet	Ilmenite	Chrome Diopside	Spinel	Other Grains	Remarks
	+16	4 N.K.	—	—	—	1 TOPAZ.	
	+25	3 N.K.	—	—	—	2 TOPAZ: 2 ZIRCONS	
	+44	6 N.K.	—	—	—	3 TOURMALINE: 2 ZIRCONS. 4 TOPAZ: 4 PYROXENE:	
LSD 9	+60	—	—	—	—	—	
	+16	1 N.K.	—	—	—	1 TOPAZ.	
	+25	5 N.K.	—	—	10	10 TOPAZ: 1 ZIRCON.	
	+44	11 N.K.	—	—	15	1 TOURMALINE: 6 ZIRCONS: 1 RUTILE: 5 TOPAZ.	
LSD 10	+60	—	—	—	—	—	
	+16	3 N.K.	—	—	4	3 TOPAZ.	
	+25	3 N.K.	—	—	6	6 ZIRCONS:	
	+44	8 N.K.	—	—	15	2 TOURMALINE: 1 ZIRCON: 4 GOLD.	
LSD 11	+60	—	—	—	—	—	
	+16	—	—	—	—	—	
	+25	5 N.K.	—	—	5	10 PYROXENE: 5 TOURMALINE.	
	+44	10 N.K.	—	—	10	9 PYROXENE: 6 ZIRCONS: 5 TOURMALINE:	
LSD 14	+60	—	—	—	—	—	
	+16	1 N.K.	—	—	—	—	
	+25	14 N.K.	—	—	2	3 ZIRCONS: 1 TOURMALINE.	
	+44	20 N.K.	—	—	5	2 RUTILE: 1 CASSITERITE. 1 GOLD: 3 TOURMALINE.	
LSD 16	+60	—	—	—	—	—	
	+16	3 N.K.	—	—	—	10 TOPAZ:	
	+25	5 N.K	—	—	3	15 TOPAZ: 3 TOURMALINE: 1 ZIRCON.	
	+44	10 N.K.	—	—	10	2 ZIRCONS: 30 TOPAZ. 2 TOURMALINE: 1 GOLD.	
LSD 20	+60	—	—	—	—	—	

SAMPLES RECEIVED IN LAB ......11.5.84...... SAMPLES SEPARATED ......11.5.84......

SAMPLES UNPACKED AND CHECKED ...11.5.84...... SLIDES CHECKED ......20.6.84......

083

233084 A1.3.22

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CONSIGNMENT ...AA. 15697. SAMPLE No's. LSD.- 1 : 2 : 3 : 4 : 6 : 8 : 9 : 10 : 11 : 14 : 16 : 20 : 21 : 24 : 25 : 27 DATE 20.6.84

Sample No.	Mesh Size	Garnet	Ilmenite	Chrome Diopside	Spinel	Other Grains	Remarks
	+16	1 N.K.	—	—	—	1 Topaz.	
	+25	11 N.K.	—	—	10	5 Topaz: 1 Tourmaline.	
	+44	15 N.K.	—	—	20	3 Cassiterite. 10 Topaz: 5 Gold	
LSD 21	+60	—	—	—	—	—	
	+16	—	—	—	2	—	
	+25	5 N.K.	—	—	2	2 Topaz: 4 Gold.	
	+44	21 N.K.	—	—	10	4 Pyroxene: 2 Tourmaline: 4 Topaz: 6 Gold, 2 Cassiterite.	
LSD 24	+60	—				—	
	+16	—	—	—	—	—	
	+25	2 N.K.	—	—	1	2 Gold: 1 Topaz.	
	+44	10 N.K.	—	—	5	3 Cassiterite: 5 Topaz: 4 Gold: 4 Tourmaline:	
LSD 25	+60	—	—	—	—	—	
	+16	3 N.K.	—	—	—	1 Rutile: 1 Gold: 3 Topaz.	
	+25	20 N.K.		—	5	3 Tourmaline: 2 Cassiterite: 4 Zircons: 4 Gold: 5 Topaz:	
	+44	30 N.K.	—	—	10	5 Gold: 10 Topaz: 4 Tourmaline: 4 Zircons:	
LSD 27	+60	—	—	—	—	—	
	+16						
	+25						
	+44						
	+60						
	+16						
	+25						
	+44						
	+60						

SAMPLES RECEIVED IN LAB ....11.5.84........ SAMPLES SEPARATED ....11.5.84........

SAMPLES UNPACKED AND CHECKED ...11.5.84....... SLIDES CHECKED 20.6.84

APPENDIX 1.4

BADGER PLAINS BLOCK

ANALYTICAL DATA TABLE

From various Analabs Reports

085

233086 A1.4.2

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1162	13.5.82		1 OF 2

LINE No.	SAMPLE No.	Cu	Zn	Pb					
1	49 - 10075	45	130	5					
2	49 - 11025	295	95	X					
3	49 - 11075	255	75	10					
4	49 - 11125	475	185	10					
5	49 - 11175	1000	200	5					
6	49 - 11225	280	70	10					
7	49 - 11275	275	75	X					

086

233087 A1.4.3.

14	-49 -80#	11000		55	40	0.5	X			
15	-49 -80#	11050		245	50	X	10			
16	-49 -80#	11100		145	45	0.5	10			
17	-49 -80#	11150		525	125	X	X			
18	-49 -80#	11200		215	85	X	10			
19	-49 -80#	11250		180	40	X	10			
20	-49 -80#	11300		75	70	0.5	10			
21	-49 -80#	11350		15	70	X	5			
22	-49 -80#	11400		55	85	X	15			
23	-49 -80#	11450		55	75	X	5			
24	-49 -80#	11500		55	90	X	5			
25	-49 -80#	11550		15	50	0.5	5			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER B. D[illegible]

087

233088

A1.4.4

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		4 OF 16

	SAMPLE No.			Cu	Zn	Ag	Pb			
1	-49 -80#	11600		35	65	X	5			
2	-49 -80#	11650		120	65	0.5	10			
3	-49 -80#	11700		55	40	X	X			
4	-49 -80#	11750		165	35	X	5			
5	-49 -80#	11800		105	55	0.5	10			
6	-49 -80#	11850		85	95	X	15			
7	-49 -80#	11900		205	100	X	X			
8	-49 -80#	11950		185	110	X	15			
9	-49 -80#	12000		135	65	0.5	5			
10	-49 -80#	12050		245	160	X	15			
11	-49 -80#	12100		155	70	0.5	10			
12	-49 -80#	12150		80	50	X	5			
13	-49 -80#	12200		95	75	X	15			
14	-49 -80#	12250		60	55	0.5	10			
15	-49 -80#	12300		25	75	0.5	5			
16	-49 -80#	12350		35	75	X	5			
17	-49 -80#	12400		45	65	0.5	X			
18	-49 -80#	12450		75	70	X	5			
19	-49 -80#	12500		155	105	X	20			
20	-49 -80#	12550		115	60	0.5	5			
21	-49 -80#	12600		190	55	X	15			
22	-49 -80#	12650		125	45	X	5			
23	-49 -80#	12700		140	50	X	10			
24	-49 -80#	12750		70	45	X	15			
25	-49 -80#	12800		95	55	X	5			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER B Dor[illegible]

233089

088

A1.4.5

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		5 OF 16

SAMPLE No.			Cu	Zn	Ag	Pb			
-49 -80#	12850		135	65	X	10			
-49 -80#	12900		425	90	X	10			
-49 -80#	12950		165	50	0.5	10			
-49 -80#	13000		175	55	0.5	10			
-49 -80#	13050		135	125	X	10			
-49 -80#	13100		170	55	X	X			
-49 -80#	13150		185	90	0.5	5			
-49 -80#	13200		150	45	X	X			
-49 -80#	13250		105	45	X	5			
-49 -80#	13300		80	45	X	X			
-49 -80#	13350		70	55	0.5	X			
-49 -80#	13400		115	60	X	X			
-49 -80#	13450		100	55	X	X			
-49 -80#	13500		165	105	X	X			
-49 -80#	13550		145	65	X	5			
-49 -80#	13600		125	105	X	10			
-49 -80#	13650		95	25	X	5			
-49 -80#	13700		355	155	X	X			
-49 -80#	13750		360	155	X	5			
-49 -80#	13800		425	110	X	10			
-49 -80#	13850		25	35	X	10			
-49 -80#	13900		160	125	X	X			
-49 -80#	13950		115	100	X	15			
-49 -80#	14000		75	80	X	10			
-49 -80#	14050		105	110	X	10			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER

089

233090 A1.4.6

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		6 OF 16

	SAMPLE No.			Cu	Zn	Ag	Pb			
1	-49 -80#	14100		75	95	X	15			
2	-49 -80#	14150		165	140	X	10			
3	-49 -80#	14200		105	85	X	10			
4	-49 -80#	14250		70	95	X	15			
5	-49 -80#	14300		75	75	X	25			
6	-49 -80#	14350		155	125	X	5			
7	-49 -80#	14400		105	75	0.5	20			
8	-49 -80#	14450		85	95	X	10			
9	-49 -80#	14500		50	55	X	15			
10	-49 -80#	14550		55	85	X	15			
11	-49 -80#	14600		55	95	X	10			
12	-49 -80#	14650		125	105	X	15			
13	-49 -80#	14700		125	115	X	10			
14	-49 -80#	14750		165	100	X	15			
15	-49 -80#	14800		145	65	X	10			
16	-49 -80#	14850		100	35	X	20			
17	-49 -80#	14900		145	70	X	25			
18	-49 -80#	14950		160	95	X	10			
19	-49 -80#	15000		200	95	X	10			

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		1 OF 16

	SAMPLE No.			Cu	Zn	Ag	Pb			
1	-49 -80#	1505		200	145	X	5			
2	-49 -80#	1510		215	145	X	15			
3	-49 -80#	1515		180	105	X	10			
4	-49 -80#	1525		260	80	X	5			
5	-49 -80#	1535		65	35	0.5	10			
6	-49 -80#	1540		140	55	X	15			
7	-49 -80#	1550		170	250	0.5	5			
8	-49 -80#	1555		115	60	X	5			
9	-49 -60#	1560		80	30	X	5			
10	-49 -80#	1565		215	85	X	10			
11	-49 -80#	1570		205	120	X	5			
12	-49 -80#	1575		165	85	0.5	5			
13	-49 -80#	1580		305	125	X	10			
14	-49 -80#	1585		185	120	X	10			
15	-49 -80#	1590		235	105	X	10			
16	-49 -80#	1595		235	90	X	15			
17	-49 -80#	1600		75	50	0.5	10			
18	-49 -80#	1605		50	65	X	15			
19	-49 -80#	1610		45	45	X	15			
20	-49 -80#	1620		20	25	X	10			
21	-49 -80#	1625		5	20	0.5	15			
22	-49 -80#	1630		5	15	0.5	10			
23	-49 -80#	1640		15	15	X	20			
24	-49 -80#	1645		5	15	0.5	20			
25	-49 -80#	1650		25	20	X	25			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		2 OF 16

	SAMPLE No.			Cu	Zn	Ag	Pb			
1	-49 -80#	1655		70	155	X	30			
2	-49 -80#	1665		5	15	X	20			
3	-49 -80#	1670		50	45	0.5	15			
4	-49 -80#	1675		155	70	X	10			
5	-49 -80#	1680		315	105	X	10			
6	-49 -80#	1685		130	55	X	20			
7	-49 -80#	1690		95	65	0.5	10			
8	-49 -80#	1695		105	70	X	10			
9	-49 -80#	1700		5	X	X	X			

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233093 A1.4.9

8	-49 -40+80# 11000	55	40	X	15			
9	-49 -40+80# 11050	235	50	X	X			
10	-49 -40+80# 11100	140	45	X	15			
11	-49 -40+80# 11150	505	115	X	10			
12	-49 -40+80# 11200	195	75	0.5	10			
13	-49 -40+80# 11250	180	35	0.5	X			
14	-49 -40+80# 11300	80	75	X	X			
15	-49 -40+80# 11350	20	75	0.5	15			
16	-49 -40+80# 11400	60	90	X	X			
17	-49 -40+80# 11450	55	75	X	5			
18	-49 -40+80# 11500	65	95	0.5	X			
19	-49 -40+80# 11550	25	55	0.5	15			
20	-49 -40+80# 11600	40	65	X	10			
21	-49 -40+80# 11650	135	65	0.5	10			
22	-49 -40+80# 11700	55	35	0.5	10			
23	-49 -40+80# 11750	170	35	X	10			
24	-49 -40+80# 11800	115	55	X	X			
25	-49 -40+80# 11850	95	110	X	75			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		10 OF 16

LINE No.	SAMPLE No.	Cu	Zn	Ag	Pb			
1	-49 -40+80# 11900	205	105	X	5			
2	-49 -40+80# 11950	235	125	0.5	5			
3	-49 -40+80# 12000	125	75	X	10			
4	-49 -40+80# 12050	210	150	X	10			
5	-49 -40+80# 12100	155	70	0.5	10			
6	-49 -40+80# 12150	85	65	X	20			
7	-49 -40+80# 12200	95	90	0.5	15			
8	-49 -40+80# 12250	65	55	X	10			
9	-49 -40+80# 12300	25	85	X	5			
10	-49 -40+80# 12350	45	80	X	15			
11	-49 -40+80# 12400	55	100	X	X			
12	-49 -40+80# 12450	85	75	X	10			
13	-49 -40+80# 12500	170	110	X	5			
14	-49 -40+80# 12550	165	65	X	50			
15	-49 -40+80# 12600	210	70	X	10			
16	-49 -40+80# 12650	155	60	X	10			
17	-49 -40+80# 12700	145	60	X	15			
18	-49 -40+80# 12750	85	55	X	5			
19	-49 -40+80# 12800	95	70	X	10			
20	-49 -40+80# 12850	140	65	X	5			
21	-49 -40+80# 12900	485	105	X	25			
22	-49 -40+80# 12950	195	60	X	15			
23	-49 -40+80# 13000	190	70	0.5	20			
24	-49 -40+80# 13050	145	125	X	25			
25	-49 -40+80# 13100	175	70	0.5	15			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		11 OF 16

LINE No.	SAMPLE No.	Cu	Zn	Ag	Pb			
1	-49 -40+80# 13150	200	95	X	15			
2	-49 -40+80# 13200	155	45	X	15			
3	-49 -40+80# 13250	105	55	0.5	10			
4	-49 -40+80# 13300	90	55	X	10			
5	-49 -40+80# 13350	85	60	X	10			
6	-49 -40+80# 13400	115	60	X	10			
7	-49 -40+80# 13450	100	50	X	20			
8	-49 -40+80# 13500	160	105	X	15			
9	-49 -40+80# 13550	150	75	X	5			
10	-49 -40+80# 13600	145	105	X	20			
11	-49 -40+80# 13650	105	45	X	10			
12	-49 -40+80# 13700	375	165	X	10			
13	-49 -40+80# 13750	300	135	X	5			
14	-49 -40+80# 13800	405	105	X	10			
15	-49 -40+80# 13850	20	35	0.5	10			
16	-49 -40+80# 13900	135	130	X	10			
17	-49 -40+80# 13950	120	110	X	15			
18	-49 -40+80# 14000	60	85	X	10			
19	-49 -40+80# 14050	105	95	X	10			
20	-49 -40+80# 14100	80	90	X	20			
21	-49 -40+80# 14150	165	135	X	10			
22	-49 -40+80# 14200	105	80	X	25			
23	-49 -40+80# 14250	70	90	X	20			
24	-49 -40+80# 14300	70	75	X	15			
25	-49 -40+80# 14350	145	105	X	30			

Results in ppm unless otherwise specified

T = element present; but concentration too low to measure

X = element concentration is below detection limit

— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		12 OF 1

Line No.	SAMPLE No.	Cu	Zn	Ag	Pb			
1	-49 -40+80# 14400	115	70	0.5	10			
2	-49 -40+80# 14450	85	90	0.5	30			
3	-49 -40+80# 14500	50	55	X	15			
4	-49 -40+80# 14550	55	75	X	5			
5	-49 -40+80# 14600	55	95	X	15			
6	-49 -40+80# 14650	135	105	X	10			
7	-49 -40+80# 14700	125	110	X	15			
8	-49 -40+80# 14750	165	95	0.5	X			
9	-49 -40+80# 14800	155	55	X	5			
10	-49 -40+80# 14850	105	35	X	X			
11	-49 -40+80# 14900	150	60	X	X			
12	-49 -40+80# 14950	160	85	X	X			
13	-49 -40+80# 15000	215	100	X	X			
20	-49 -40+80# 1505	225	145	X	10			
21	-49 -40+80# 1510	205	165	X	15			
22	-49 -40+80# 1515	180	165	X	5			
23	-49 -40+80# 1525	265	85	X	25			
24	-49 -40+80# 1535	75	40	X	10			
25	-49 -40+80# 1540	130	55	X	10			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		7 OF 11

	SAMPLE No.			Cu	Zn	Ag	Pb			11
1	-49 -40+80# 1550			165	245	X	10			
2	-49 -40+80# 1555			120	65	X	20			
3	-49 -40+80# 1560			85	45	X	10			
4	-49 -40+80# 1565			210	90	X	15			
5	-49 -40+80# 1570			215	115	X	15			
6	-49 -40+80# 1575			170	85	X	20			
7	-49 -40+80# 1580			305	125	X	10			
8	-49 -40+80# 1585			175	115	X	25			
9	-49 -40+80# 1590			235	105	X	10			
10	-49 -40+80# 1595			265	95	X	10			
11	-49 -40+80# 1600			75	50	X	60			
12	-49 -40+80# 1605			60	210	X	710			
13	-49 -40+80# 1610			45	45	X	70			
14	-49 -40+80# 1620			40	25	X	70			
15	-49 -40+80# 1625			10	20	X	25			
16	-49 -40+80# 1630			15	10	X	20			
17	-49 -40+80# 1640			30	20	X	40			
18	-49 -40+80# 1645			10	10	X	25			
19	-49 -40+80# 1650			30	10	X	25			
20	-49 -40+80# 1655			75	165	X	40			
21	-49 -40+80# 1665			15	15	X	60			
22	-49 -40+80# 1670			55	50	X	35			
23	-49 -40+80# 1675			155	65	X	15			
24	-49 -40+80# 1680			275	100	X	10			
25	-49 -40+80# 1685			110	50	X	30			

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1024	22.3.82		8 OF 16

LINE No.	SAMPLE No.			Cu	Zn	Ag	Pb			
1	-49 -40+80# 1690			85	60	X	15			
2	-49 -40+80# 1695			95	60	0.5	15			
3	-49 -40+80# 1700			10	10	X	5			

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1994	4.5.83		2 OF 3

TUBE No.	SAMPLE No.		Cu	Pb	Zn				
1	11.0 48975		430	10	160				
2	11.0 49025		80	5	175				
3	11.0 49050		80	X	145				
4	11.2 48950		105	5	30				
5	11.2 48975		55	X	5				
6	11.2 49025		115	10	55				
7	11.2 49050		5	5	20				
8	11.2 49075		80	5	50				
9	11.2 49100		80	10	100				
10	11.3 48975		195	10	50				
11	11.3 49025		95	15	55				
12	11.3 49050		70	15	145				
13	11.3 49075		590	20	145				
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1099	14.4.82		6 OF 13

TUBE No.	SAMPLE No.	Cu	Zn	Pb					
1	11.1 47700	70	80	25					
2	11.1 47800	60	65	5					
3	11.1 48000	85	95	15					
4	11.1 48050	85	115	20					
5	11.1 48075	90	95	10					
6	11.1 48100	85	90	5					
7	11.1 48125	80	155	15					
8	11.1 48150	85	115	15					
9	11.1 48200	45	165	20					
10	11.1 48250	80	105	20					
11	11.1 48275	105	125	25					
12	11.1 48300	70	105	20					
13	11.1 48325	50	105	20					
14	11.1 48350	95	115	15					
15	11.1 48375	115	140	15					
16	11.1 48400	75	110	5					
17	11.1 48425	100	95	20					
18	11.1 48450	95	140	20					
19	11.1 48475	65	155	20					
20	11.1 48500	55	145	15					
21	11.1 48525	110	200	25					
22	11.1 48575	65	125	15					
23	11.1 48600	150	155	30					
24	11.1 48625	90	100	20					
25	11.1 48700	110	85	20					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1099	14.4.82		7 OF 1

TUBE No.	SAMPLE No.		Cu	Zn	Pb					
1	11.1 48725		135	55	25					
2	11.1 48750		170	35	15					
3	11.1 48775		185	45	15					
4	11.1 48800		155	65	25					
5	11.1 48825		235	120	20					
6	11.1 48850		200	145	10					
7	11.1 48875		30	90	10					
8	11.1 48900		5	55	10					
9	11.1 48925		90	30	25					
10	11.1 48950		10	10	35					
11	11.6 48125		50	80	25					
12	11.6 48150		50	75	15					
13	11.6 48175		80	95	10					
14	11.6 48200		60	70	25					
15	11.6 48225		65	70	15					
16	11.6 48250		70	55	25					
17	11.6 48275		95	75	15					
18	11.6 48300		115	100	15					
19	11.6 48325		140	75	5					
20	11.6 48350		85	70	20					
21	11.6 48375		65	60	25					
22	11.6 48400		70	75	15					
23	11.6 48425		45	80	25					
24	11.6 48450		45	70	15					
25	11.6 48475		65	110	15					

Results in ppm unless otherwise specified
- T = element present: but concentration too low to measure
- X = element concentration is below detection limit
- — = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1099	14.4.82		8 OF 13

TUBE No.	SAMPLE No.	Cu	Zn	Pb					
1	11.6 48500	65	90	20					
2	11.6 48525	45	35	20					
3	11.6 48550	40	60	20					
4	11.6 48575	110	130	30					
5	11.6 48600	80	85	20					
6	11.6 48625	75	85	20					
7	11.6 48650	80	95	30					
8	11.6 48675	240	165	25					
9	11.6 48700	30	90	25					
10	11.6 48725	80	120	10					
11	11.6 48750	65	115	30					
12	11.6 48775	60	95	15					
13	11.6 48800	55	100	25					
14	11.6 48825	110	130	10					
15	11.6 48850	70	95	15					
16	11.6 48875	100	100	10					
17	11.6 48900	65	105	10					
18	11.6 48925	30	95	15					
19	11.6 48950	20	120	5					
20	11.6 48975	5	50	10					
21									
22									
23									
24									
25									

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233103 A1.4.19

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	296.1 0# 2043	31.5.83		1 OF 5

TUBE No.	SAMPLE No.	Cu	Pb	Zn				
1	12.5 47050	25	20	45				
2	12.5 47075	85	10	75				
3	12.5 47150	50	25	95				
4	12.5 47175	80	X	70				
5	12.5 47200	55	5	60				
6	12.5 47225	110	5	90				
7	12.5 47250	75	X	100				
8	12.5 47275	85	10	90				
9	12.5 47300	90	15	95				
10	12.5 47325	80	10	80				
11	12.5 47350	75	10	90				
12	12.5 47375	30	20	35				
13	12.5 47400	50	10	35				
14	12.5 47425	75	20	60				
15	12.5 47450	55	15	45				
16	12.5 47475	110	25	70				
17	12.5 47500	80	20	75				
18	12.5 47525	115	10	175				
19	12.5 47550	50	15	120				
20	12.5 47575	90	15	155				
21	12.5 47600	95	20	150				
22	12.5 47625A	100	25	90				
23	12.5 47625B	105	25	85				
24	12.5 47650	100	20	105				
25	12.5 47675	120	10	100				

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233104 A1.4.20

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 2043	31.5.83		2 OF 5

TUBE No.	SAMPLE No.	Cu	Pb	Zn					
1	12.5 47700	75	30	75					
2	12.5 47750	45	25	45					
3	12.5 47775	20	15	10					
4	12.5 47800	15	10	15					
5	12.5 47850	85	5	80					
6	12.5 47875A	75	10	85					
7	12.5 47875B	115	10	105					
8	12.5 47900	100	5	90					
9	12.5 47950	45	15	25					
10	12.5 47975	115	15	25					

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1146	29.4.82		1 OF 4

TUBE No.	SAMPLE No.	Cu	Zn	Sn	Pb				
1	13.1 48175	X	5	—	X				
2	13.1 48250	45	40	—	10				
3	13.1 48275	60	50	—	10				
4	13.1 48300	65	50	—	25				
5	13.1 48325	40	45	—	10				
6	13.1 48350	40	35	—	10				
7	13.1 48375	45	40	—	10				
8	13.1 48400	65	50	—	10				
9	13.1 48425	50	45	—	5				
10	13.1 48450	85	85	—	5				
11	13.1 48475	85	85	—	20				
12	13.1 48500	120	100	—	10				
13	13.1 48525	125	90	—	10				
14	13.1 48550	55	80	—	10				
15	13.1 48575	70	75	—	X				
16	13.1 48600	90	75	—	20				
17	13.1 48625	50	45	—	5				
18	13.1 48650	85	75	—	20				
19	13.1 48675	55	70	—	5				
20	13.1 48700	250	55	—	10				
21	13.1 48725	50	105	—	15				
22	13.1 48750	80	95	—	15				
23	13.1 48775	50	60	—	15				
24	13.1 48800	45	65	—	15				
25	13.1 48825	70	100	—	15				

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	230.1 82 1146	29.4.82		2 OF 4

TUBE No.	SAMPLE No.	Cu	Zn	Sn	Pb
1	13.1 48850	80	110	–	20
2	13.1 488.5	125	100	–	10
3	13.1 48900	165	125	–	10
4	13.1 48925	145	105	–	10
5	13.1 48950	230	145	–	10
6	13.1 48975	375	160	–	15

106

233107 A1.4.23

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
49	236.1 08 2506(	15.8.84		8 OF 8

JBS No.	SAMPLE No.	Ag	Ni	As						
1	11075	X	105	14						
2	11125	X	120	8						
3	11175	X	155	X						
4	11225	X	80	1						
5	11275	X	75	X						
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.5	5	1						
24	DIGESTION									
25	METHOD	101	101	114						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
EASTING 49	236.1 08 2506(	29.8.84		3 OF 8

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	10950	–	35	14						
2	11000	–	40	5						
3	11050	–	70	7						
4	11100	–	75	11						
5	11150	–	115	3						
6	11200	–	90	3						
7	11250	–	60	2						
8	11300	–	50	10						
9	11350	–	50	2						
[illegible]	11400	–	60	3						
11	11450	–	60	2						
[illegible]	11500	–	70	2						
13	11550	–	50	3						
[illegible]	11600	–	60	4						
[illegible]	11650	–	80	13						
[illegible]	11700	–	55	5						
[illegible]	11750	–	45	5						
18	11800	–	105	3						
[illegible]	11850	–	145	8						
[illegible]	11900	–	140	3						
21	11950	–	185	3						
[illegible]	12000	–	115	6						
23	12050	–	90	4						
[illegible]	12100	–	85	3						
[illegible]	12150	–	100	7						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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108

233109 A1.4.25

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
EASTING 49	236.1 08 2506(	29.8.84		4 OF 8

	SAMPLE No.	Ag	Ni	As						
1	12200	–	160	6						
	12250	–	75	5						
	12300	–	65	3						
	12350	–	70	4						
	12400	–	75	3						
6	12450	–	70	3						
	12500	–	95	2						
	12550	–	70	X						
	12600	–	65	1						
	12650	–	55	X						
11	12700	–	55	X						
	12750	–	60	1						
13	12800	–	80	X						
	12850	–	100	X						
	12900	–	110	X						
	12950	–	65	X						
	13000	–	70	1						
18	13050	–	125	X						
	13100	–	65	X						
	13150	–	85	X						
21	13200	–	70	1						
	13250	–	65	2						
23	13300	–	70	2						
	13350	–	85	2						
	13400	–	70	1						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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109

233110

A1.4.26

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
EASTING 49	236.1 08 2506(	29.8.84		5 OF 8

No.	SAMPLE No.	Ag	Ni	As						
	13450	–	85	2						
2	13500	–	100	1						
3	13550	–	55	2						
	13600	–	115	2						
5	13650	–	40	2						
	13700	–	125	X						
7	13750	–	115	1						
	13800	–	100	1						
	13850	–	40	1						
10	13900	–	130	1						
	13950	–	105	1						
12	14000	–	80	1						
	14050	–	105	1						
	14100	–	100	3						
15	14150	–	115	1						
	14200	–	135	5						
17	14250	–	115	4						
	14300	–	125	5						
	14350	–	180	2						
20	14400	–	65	2						
	14450	–	115	5						
22	14500	–	65	4						
	14550	–	105	7						
	14600	–	105	4						
25	14650	–	125	2						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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110

233111 A1.4.27

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
EASTING 49	236.1 08 2506(	29.8.84		6 OF 8

TUBE No.	SAMPLE No.	Ag	Ni	As					
1	14700	–	170	2					
2	14750	–	140	2					
3	14800	–	75	X					
4	14850	–	60	X					
5	14900	–	70	2					
6	14950	–	85	1					
7	15000	–	85	1					
8	1505	–	120	3					
9	1510	–	115	2					
10	1515	–	95	2					
11	1525	–	105	1					
12	1535	–	40	1					
13	1540	–	60	2					
14	1550	–	135	1					
15	1555	–	75	1					
	1560	–	45	2					
17	1565	–	90	2					
18	1570	–	110	3					
19	1575	–	85	3					
20	1580	–	115	3					
21	1585	–	130	2					
22	1590	–	90	2					
23	1595	–	110	2					
24	1600	–	65	12					
25	1605	–	90	6					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233112

A1.4.28

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
EASTING 49	236.1 08 2506(	29.8.84		7 OF 8

SAMPLE No.	Ag	Ni	As						
1610	–	75	6						
1620	–	45	5						
1625	–	20	X						
1630	–	20	X						
1640	–	25	7						
1645	–	15	1						
1650	–	55	15						
1655	–	220	13						
1665	–	20	13						
1670	–	90	9						
1675	–	70	4						
1680	–	135	1						
1685	–	75	3						
1690	–	70	1						
1695	–	70	1						
1700	–	30	X						

112

233113 A1.4.29

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 11.0	236.1 08 2506(	15.8.84		1 OF 1

SAMPLE No.	Ag	Ni	As						
48900	X	100	4						
48925	X	85	2						
48950	X	65	11						
48975	X	110	2						
49025	X	110	7						
49050	X	115	20						
DETECTION	0.5	5	1						
DIGESTION									
METHOD	101	101	114						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233114

A1.4.30

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
UE 11.1	236.1 08 2506(	29.8.84		1 OF 7

SAMPLE No.	Ag	Ni	As						
47700	X	120	2						
47800	X	145	X						
48000	I/S	–	–						
48050	X	215	1						
48075	X	280	23						
48100	X	375	X						
48125	X	280	X						
48150	X	195	X						
48200	X	230	X						
48225	X	110	12						
48250	X	125	8						
48275	X	125	5						
48300	X	130	12						
48325	X	85	12						
48350	X	175	12						
48375	X	210	10						
48400	X	145	23						
48425	X	175	20						
48450	X	200	13						
48475	X	205	12						
48500	X	200	14						
48525	X	155	8						
48500	X	220	5						
48575	X	130	10						
48600	X	180	12						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 11.1	236.1 08 2506(	15.8.84		2 OF 7

TRAY No.	SAMPLE No.	Au	Ni	As
1	40625	X	160	12
2	48700	X	180	7
3	48725	X	95	X
4	48750	X	75	X
5	48775	X	85	X
6	48800	X	90	X
7	48825	X	95	17
8	48860	X	115	10
9	48875	X	70	11
10	48900	X	55	X
11	48925	X	35	X
12	48950	I/S	-	-
13	48975	X	55	4
14	49025	X	85	23

115

233116 A1.4.32

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 12.5	236.1 08 [illegible]	15.8.84		1 OF

TUBE No.	SAMPLE No.	Ag	Ni	As							
1	47050	X	65	5							
2	47075	X	105	15							
3	47150	X	105	6							
4	47175	X	140	11							
5	47200	X	115	10							
6	47225	X	[illegible]	14							
7	47250	X	115	17							
8	47275	X	115	20							
9	47300	X	150	11							
10	47325	X	160	12							
11	[illegible]	X	[illegible]	[illegible]							
12	[illegible]	X	[illegible]	[illegible]							
13	[illegible]	[illegible]	[illegible]	[illegible]							
14	[illegible]		[illegible]	[illegible]							
15	[illegible]		[illegible]	[illegible]							
16	[illegible]		[illegible]	[illegible]							
17	[illegible]		[illegible]	[illegible]							
18	[illegible]		[illegible]	[illegible]							
19	[illegible]		[illegible]	[illegible]							
20	[illegible]		[illegible]	[illegible]							
21	[illegible]		[illegible]								
22	[illegible]		[illegible]	[illegible]							
23	[illegible]		[illegible]	[illegible]							
24	[illegible]			[illegible]							
25	[illegible]		[illegible]	[illegible]							

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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116

233117 A1.4.33

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 12.5	[illegible]6.1 08 [illegible]	[illegible].8.84		2 OF [illegible]

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	47700	X	105	23						
2	47750	X	55	25						
3	47775	X	30	20						
4	47800	X	25	13						
5	47850	X	340	8						
6	47875A	X	255	14						
7	47875B	X	375	14						
8	47900	X	250	3						
9	47950	X	35	4						
10	47975	X	80	14						
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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117

233118 A1.4.34

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 13.1	236.1 08 2506<	28.8.84		1 OF 4

TUBE No.	SAMPLE No.	Ag	Ni	As							
	48175	X	10	X							
	48250	X	75	9							
3	48275	X	105	11							
	48300	X	70	16							
5	48325	X	50	9							
	48350	X	45	11							
	48375	X	50	8							
8	48400	X	65	11							
	48425	X	45	15							
10	48450	X	65	11							
	48475	X	95	10							
	48500	X	135	8							
13	48525	X	135	8							
	48550	X	85	10							
15	48575	X	100	7							
	48600	X	145	12							
17	48625	X	60	20							
	48650	X	110	8							
	48675	X	80	6							
20	48700	X	160	28							
	48725	X	125	7							
22	48750	X	105	5							
	48775	X	75	5							
	48800	X	60	3							
5	48825	X	105	8							

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233119 A1.4.35

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 13·1	236.1 08 2506(	28.8.84		2 OF 4

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	48850	X	105	7						
2	48875	X	80	2						
3	48900	X	105	2						
4	48925	X	85	2						
5	48950	X	100	1						
6	48975	X	110	1						
7	[illegible]	X	100	7						

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233120 A1.4.36

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 144	236.1 08 2506(	15.8.84		1 OF 3

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	48050	X	70	2						
2	48075	X	65	12						
3	48100	X	80	3						
4	48125	X	35	5						
5	48150	X	100	1						
6	48175	X	95	13						
7	48200	X	105	6						
8	48225	X	170	5						
9	48250	X	235	2						
10	48275	X	165	12						
11	48300	X	185	2						
12	48325	X	165	4						
13	48350	X	185	11						
14	48375	X	170	4						
15	48400	X	200	X						
16	48425	X	165	5						
17	48450	X	165	4						
18	48475	X	175	4						
19	48500	X	85	3						
20	48525	X	80	6						
21	48550	X	80	2						
22	48575	X	115	4						
23	48600	X	100	4						
24	48625	X	200	3						
25	48650	X	105	5						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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120

233121

A1.4.37

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
NE 14.4	236.1 08 2506(	15.8.84		2 OF 3

SAMPLE No.	Ag	Ni	As						
48675	X	155	5						
48700	X	90	10						
48725	X	100	18						
48750	X	130	18						
48775	X	90	24						
48800	X	85	11						
48825	X	140	2						
48850	X	125	4						
48875	X	105	4						
48900	X	210	10						
48925	X	215	15						
48950	X	150	2						
48975	X	80	1						
49025	X	115	5						

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APPENDIX 2.1

BRODERICK CREEK BLOCK

Stream Sediment Sample Data - Heavy Mineral Series
Fines Analysis Results

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

BRODERICK CREEK BLOCK

Sample Number	Creek/River	Location N	Location E	Remarks
28	Tributary of Pineapple Creek	16.33	52.90	Rocky creek bed
29	Pineapple Creek	16.19	52.95	" " "
30	Tributary of Pineapple Creek	15.80	51.83	" " "
31	Pineapple Creek	16.00	51.85	" " "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

BRODERICK CREEK BLOCK

Sample Number	Element (ppm)													Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
28	40	15	90	5	x			x	1		85	IS			
29	35	20	50	5	x			x	4		IS	IS			
30	30	15	110	10	x			x	5		100	IS			
31	45	20	90	x	x			x	4		80	IS			

APPENDIX 2.2

BRODERICK CREEK BLOCK

ANALYTICAL DATA TABLE

From various Analabs reports

124

233125 A2.2.2

Line 11.1

		Cu	Zn	Pb					
20	11.1 49925	40	55	X					
21	11.1 49950	10	35	10					
22	11.1 49975	30	50	10					
23	11.1 50000	45	95	10					
24	11.1 50025	15	50	15					
25	11.1 50050	30	45	10					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233126

A2.2.3

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 11·1	236.1 08 1162	13.5.82		3 OF 21

TUBE No.	SAMPLE No.	Cu	Zn	Pb
1	11.1 50075	X	10	X
2	11.1 50100	30	20	X
3	11.1 50125	20	45	X
4	11.1 50150	45	10	5
5	11.1 50175	15	20	X
6	11.1 50200	15	50	X
7	11.1 50225	20	60	X
8	11.1 50250	50	50	5
9	11.1 50275	70	70	10
10	11.1 50300	105/	80	15
11	11.1 50325	80	70	40
12	11.1 50350	70	60	20
13	11.1 50375	85	85	10
14	11.1 50400	40	175	50
15	11.1 50425	190	280	55
16	11.1 50450	250	315	145
17	11.1 50475	215	185	35
18	11.1 50500	55	95	10
19	11.1 50525	20	50	15
20	11.1 50550	80	95	30
21	11.1 50575	45	85	45
22	11.1 50600	20	85	5
23	11.1 50625	I/S	I/S	I/S
24	11.1 50650	I/S	I/S	I/S
25	11.1 50675	10	10	X

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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126

233127 A2.2.4

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 11.1	236.1 08 1162	13.5.82		4 OF 21

TUBE No.	SAMPLE No.	Cu	Zn	Pb					
1	11.1 50700	5	10	X					
2	11.1 50725	5	10	X					
3	11.1 50750	25	90	15					
4	11.1 50775	I/S	I/S	I/S					
5	11.1 50800	85	85	20					
6	11.1 50825	155	145	10					
7	11.1 50850	20	15	10					
8	11.1 50875	65	45	20					
9	11.1 50900	135	95	20					
10	11.1 50925	I/S	I/S	I/S					
11	11.1 50950	50	80	5					
12	11.1 50975	135	55	15					
13	11.1 51000	75	80	15					
14	11.1 51025	40	75	10					
15	11.1 51050	30	20	X					

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233128 A2.2.5

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1836	25.2.83		3 OF 7

TUBE No.	SAMPLE No.		Cu	Pb	Zn					
1	R 1275		X	X	5					
2	R 1300		15	X	20					
3	R 1325		25	10	30					
4	R 1350		80	5	30					
5	R 1375		25	X	70					
6	R 1400		10	X	10					
25	14.0 495/p		[illegible]	[illegible]	[illegible]					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233129 A2.2.6

Line 13.1 Cu Zn Pb

		Cu	Zn	Pb					
7									
8	13.1 49950	95	55	X					
9	13.1 49975	40	55	X					
10	13.1 50000	15	15	X					
11	13.1 50025	75	50	5					
12	13.1 50050	215	25	X					
13	13.1 50075	10	20	X					
14	13.1 50100	55	90	5					
15	13.1 50125	15	35	15					
16	13.1 50150	30	60	10					
17	13.1 50175	45	50	5					
18	13.1 50200	30	90	5					
19	13.1 [illegible]	20	95	5					
20	13.1 [illegible]	15	85	10					
21	13.1 [illegible]	10	50	5					
22	13.1 [illegible]	15	35	5					
23	13.1 [illegible]	90	55	15					
24	13.1 [illegible]	165	135	30					
25	13.1 [illegible]	175	145	35					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233130 2.2.7

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 13.1	236.1 08 1162	13.5.82		11 OF 21

TUBE No.	SAMPLE No.	Cu	Zn	Pb					
1	13.1 50400	145	115	25					
2	13.1 50425	245	215	15					
3	13.1 50450	15	30	10					
4	13.1 50475	55	45	20					
5	13.1 50500	20	35	10					
6	13.1 50525	45	45	25					
7	13.1 50550	10	20	5					

T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233131 A2.2.8

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 14.1, 14.5	236.1 08 1162	13.5.82		12 OF 21

TUBE No.	SAMPLE No.	Cu	Zn	Pb					
1	1								
2	1								
3									
4	14.1 49950	225	150	5					
5	14.1 49975	85	95	5					
6	14.1 50000	25	45	X					
7	14.1 50025	15	30	5					
8	14.1 50050	225	120	X					
9	14.1 50075	145	60	X					
10	14.1 50100	115	45	5					
11	14.1 50125	5	15	X					
12	14.1 50150	15	10	X					
13	14.1 50175	10	15	X					
14	14.1 50200	40	15	X					
15	14.1 50225	5	10	X					
16	14.1 50250	X	5	X					
17	14.1 50275	X	10	X					
18	14.1 50300	X	10	X					
19	14.1 50325	5	40	X					
20	14.1 50350	X	10	X					
21	14.1 50375	X	5	X					
22	14.1 50400	X	10	X					
23	14.1 50450	X	10	X					
24	14.5 52450	100	105	X					
25	14.5 52500	105	100	10					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233132 A2.2.9

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 14.5, 15.0	236.1 08 1162	13.5.82		13 OF 21

TUBE No.	SAMPLE No.	Cu	Zn	Pb
1	14.5 52650	60	105	10
2	14.5 52750	45	80	X
3	14.5 52800	95	65	X
4	14.5 52850	55	65	5
5	14.5 52900	95	85	15
6	14.5 52950	5	25	5
7	14.5 53100	100	85	5
8	14.5 53200	50	80	5
9	14.5 53250	80	105	5
10	14.5 53350	65	100	10
11	14.5 53450	55	105	5
12	14.5 53550	35	90	X
13	15.0 52450	60	75	5
14	15.0 52475	10	30	5
15	15.0 52500	45	95	X
16	15.0 52525	25	45	5
17	15.0 52550	25	60	X
18	15.0 52575	X	10	X
19	15.0 52600	X	10	X
20	15.0 52625	X	10	X
21	15.0 52650	X	10	X
22	15.0 52675	X	10	X
23	15.0 52700	I/S	I/S	I/S
24	15.0 52725	X	15	5
25	15.0 52750	X	5	5

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233133

A2.2.10

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 15-0, 16-4	236.1 08 1162	13.5.82		14 OF 21

UBE No.	SAMPLE No.	Cu	Zn	Pb					
1	15.0 52775	X	15	X					
2	15.0 52800	45	145	X					
3	15.0 52825	5	15	5					
4	15.0 52875	X	5	X					
5	15.0 52900	X	15	20					
6	15.0 52925	5	15	50					
7	15.0 52975	10	80	10					
8	15.0 53000	5	15	25					
9	15.0 53025	105	115	X					
10	15.0 53050	175	160	5					
11	15.0 53075	85	115	10					
12	15.0 53100	85	85	5					
22	16.4 51800	90	235	5					
23	16.4 51925	60	190	X					
24	16.4 51950	65	145	5					
25	16.4 519[illegible]	65	145	X					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233134 A2.2.11

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1162	13.5.82		15 OF 2

TUBE No.	SAMPLE No.	Cu	Zn	Pb
1	16.4 52000	90	150	X
2	16.4 52025	75	160	X
3	16.4 52050	165	235	X
4	16.4 52075	100	110	5
5	16.4 52100	105	130	X
6	16.4 52125	135	175	X
7	16.4 52150	185	315	X
8	16.4 52175	95	120	5
9	16.4 52200	90	105	10
10	16.4 52225	70	85	5
11	16.4 52275	90	120	5
12	16.4 52300	90	95	10
13	16.4 52325	125	235	10
14	16.4 52350	155	225	5
15	16.4 52400	125	200	10
16	16.4 52425	95	230	5
17	16.4 52450	75	180	15
18	16.4 52500	65	105	X
19	16.4 52525	60	100	5
20	16.4 52575	65	100	10
21	16.4 52600	105	100	10
22	16.4 52675	110	135	5
23	16.4 52700	70	100	10
24	16.4 52725	85	105	15
25	16.4 52750	70	100	10

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233135

A2.2.12

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 16-4	236.1 08 1162	13.5.82		16 OF 21

TUBE No.	SAMPLE No.	Cu	Zn	Pb
1	16.4 52800	95	155	10
2	16.4 52825	105	105	15
3	16.4 52850	75	80	10
4	16.4 52875	70	105	10
5	16.4 52900	75	85	5
6	16.4 52925	105	115	15
7	16.4 52950	180	45	5
8	16.4 52975	65	105	20
9	16.4 53000	35	75	10
10	16.4 53025	10	50	10
11	16.4 53050	5	35	10
12	16.4 53075	X	10	5
13	16.4 53100	X	5	5
14	16.4 53125	5	40	X
15	16.4 53150	10	120	55
16	16.4 53175	X	5	X

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233136

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 16-4	336.1 AS 1129	22.4.82		6 OF 8

TUBE No.	SAMPLE No.	Cu	Zn	Pb
1	16.4 52400	110	165	15
2	16.4 52500	50	80	5
3	16.4 52600	125	110	10
4	16.4 52700	65	80	15
5	16.4 52800	90	130	15
6	16.4 52900	70	75	10
23	16.4 52000	90	140	15
24	16.4 52200	60	70	15
25	16.4 52300	I/S	I/S	I/S

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233137 A2.2.14

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
Line 16-7, 16-4	236.1 08 1146	29.4.82		3 OF 4

TUBE No.	SAMPLE No.	Cu	Zn	Sn	Pb
16-7					
1	16.7 52950	145	35	X	10
2	16.7 52975	40	40	X	X
3	16.7 53000	25	35	1	X
4	16.7 53025	50	40	X	10
5	16.7 53050	75	200	X	40
6	16.7 53075	20	35	X	X
16-4					
7	16.4 52250	80	70	X	15
8	16.4 52475	60	85	X	5
9	16.4 52550	135	160	2	10
10	16.4 52625	80	70	X	10
11	16.4 52650	75	150	X	25
12	16.4 52775	110	150	3	10
16-7					
13	16.7 51700	95	140	1	25
14	16.7 51800	100	105	X	X
15	16.7 51900	80	80	X	10
16	16.7 52000	65	65	3	25
17	16.7 52100	40	55	X	10
18	16.7 52200	75	90	I/S	10
19	16.7 52300	65	70	X	25
20	16.7 52400	45	85	X	5
21	16.7 52500	75	100	1	20
22	16.7 52600	60	65	I/S	15
23	16.7 52700	70	70	X	20
24	16.7 52800	65	105	X	15
25	16.7 52900	90	90	X	20

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALABS

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233138

A2.2.15

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1146	29.4.82		2 OF 4

7	16.4 52250		80	70	X	15				
8	16.4 52475		60	85	X	5				
9	16.4 52550		135	160	2	10				
10	16.4 52625		80	70	X	10				
11	16.4 52650		75	150	X	25				
12	16.4 52775		110	150	3	10				
13	16.[illegible] 51700		95	140	1	25				
14	16.7 51800		100	105	X	X				
15	[illegible]		80	80	X	10				
16	[illegible]		65	60	3	25				
17	[illegible]		40	55	X	10				
18	[illegible]		75	90	1/3	10				
19	[illegible]		65	70	X	25				
20	[illegible]		45	85	X	5				
21	[illegible]		75	100	1	20				
22	[illegible]		60	65	1/S	15				
23	[illegible]		70	70	X	20				
24	[illegible]		65	105	X	10				
25	[illegible]		90	80	X	20				

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233139

A2.2.16

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	236.1 08 1146	29.4.82		3 OF 4

TUBE No.	SAMPLE No.		Cu	Zn	Sn	Pb				
1	16.7 52950		145	35	X	10				
2	16.7 52975		40	40	X	X				
3	16.7 53000		25	35	1	X				
4	16.7 53025		50	40	X	10				
5	16.7 53050		75	200	X	40				
6	16.7 53075		20	35	X	X				
7	16.7 53100		5	35	X	X				
8	16.7 53125		20	50	X	10				
9	16.7 53150		45	55	X	X				
10	16.7 53175		20	95	X	15				
11	16.7 53200		X	5	1	X				
12	12.0 52125		50	55	—	70				
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233140 A2.2.17

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 11.1	236.1 08 2506(	15.8.84		4 OF 7

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	49950	X	20	3						
2	49975	X	45	X						
3	50000	X	60	X						
4	50025	X	35	X						
5	50050	X	50	X						
6	50075	X	10	X						
7	50100	X	25	X						
8	50125	X	30	4						
9	50150	X	20	X						
10	50175	X	25	X						
11	50200	X	40	X						
12	50225	I/S	–	–						
13	50250	I/S	–	–						
14	50275	I/S	–	–						
15	50300	X	55	X						
16	50325	X	50	X						
17	50350	X	45	X						
18	50375	I/S	–	–						
19	50400	X	55	1						
20	50425	X	55	50						
21	50450	I/S	–	–						
22	50475	X	55	X						
23	50500	X	60	X						
24	50525	X	45	X						
25	50550	X	40	X						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233141 A2.2.18

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 11·1	236.1 08 2506(	15.8.84		5 OF 7

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	50575	I/S	–	–						
2	50600	X	50	X						
3	50625	I/S	–	–						
4	50650	I/S	–	–						
5	50675	X	15	X						
6	50700	X	15	X						
7	50725	X	15	2						
8	50750	X	60	28						
9	50775	I/S	–	–						
10	50800	X	65	X						
11	50825	X	100	1						
12	50850	X	20	X						
13	50875	I/S	–	–						
14	50900	X	90	5						
15	50925	I/S	–	–						
16	50950	I/S	–	–						
17	50975	X	55	3						
18	51000	I/S	–	–						
19	51025	I/S	–	–						
20	51050	X	40	4						
21	51075	X	55	3						
22	51100	I/S	–	–						
23	51125	X	25	2						
24	51175	X	40	X						
25	51200	I/S	–	–						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233142

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 13:1	236.1 08 2506C	28.8.84		3 OF 4

18	50000	X	10	3
	50025	X	50	4
	50050	X	60	5
21	50075	X	10	10
	50100	X	30	7
23	50125	X	15	10
	50150	X	30	3
	50175	X	30	5

Results in ppm unless otherwise specified
ſ = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALABS

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233143 A2.2.20

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 13·1	236.1 08 2506(	28.8.84		4 OF 4

SAMPLE No.	Ag	Ni	As						
50200	X	40	6						
50225	X	45	3						
50250	X	35	4						
50275	X	25	3						
50300	X	15	X						
50325	X	30	1						
50350	X	80	9						
50375	X	60	28						
50400	X	45	5						
50425	X	60	8						
50450	X	10	5						
50475	X	25	8						
50500	X	10	20						
50525	X	20	X						
50550	X	5	31						
DETECTION	0.5	5	1						
DIGESTION									
METHOD	101	101	114						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = *element not determined*

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ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 14-1	236.1 08 2506(	15.8.84		2 OF 3

12	50000	X	30	6
13	50025	X	30	4
14	50050	X	80	5
15	50075	X	55	9
	50100	X	55	20
17	50125	X	X	32
18	50150	X	X	8
19	50175	X	5	21
20	50200	X	35	27
21	50225	X	10	30
22	50250	X	5	24
23	50275	X	10	4
24	50300	X	5	11
25	50325	X	15	X

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233145 A2.2.22

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 14·1	236.1 08 2506(	15.8.84		3 OF 3

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	50375	X	X	7						
2	50400	X	10	X						
3	50425	X	25	2						
4	50450	X	X	5						
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.5	5	1						
24	DIGESTION									
25	METHOD	101	101	114						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233146

A2.2.23

Line 15-0, 15-0(E)

8	50800	X	[illegible]	[illegible]							
9	50850	I/S	–	–							
10	50900	I/S	–	–							
11	52450	X	90	5							
12	52475	X	135	5							
13	52500	X	45	17							
14	52525	X	15	3							
15	52550	X	30	6							
[illegible]	52575	X	X	7							
17	52600	X	X	4							
18	52625	X	X	2							
19											
20											
21											
22											
23	DETECTION	0.5	5	1							
24	DIGESTION										
25	METHOD	101	101	114							

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALABS

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233147

A2.2.24

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 15.0	236.1 08 2506A	15.8.84		1 OF 1

TUBE No.	SAMPLE No.	Ag	Ni	As						
1	52650	X	X	7						
2	52675	X	X	4						
3	52700	I/S	-	-						
4	52725	X	20	3						
5	52750	X	X	X						
6	52775	X	5	X						
	52800	X	110	21						
8	52825	X	X	86						
9	52875	X	X	10						
10	52900	X	5	3						
1	52925	X	15	4						
12	52975	X	20	X						
13	53000	I/S	-	-						
4	53025	I/S	-	-						

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233148

A2.2.25

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 16.7	236.1 08 2506(	29.8.84		3 OF 5

SAMPLE No.	Ag	Ni	As						
50800	SAMPLE	NOT	LOCATE						
50825	SAMPLE	NOT	LOCATE						
50850	X	110	4						
50875	X	95	3						
51700	X	200	3						
51800	X	240	2						
51900	X	225	5						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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233149

A2.2.26

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
LINE 16.7	236.1 08 2506(	15.8.84		4 OF 5

TUBE No.	SAMPLE No.	Ag	Ni	As					
1	52000	X	140	7					
2	52100	X	135	6					
3	52200	SAMPLE	NOT	LOCATE					
4	52300	X	145	5					
5	52400	X	210	2					
6	52500	X	190	4					
7	52600	SAMPLE	NOT	LOCATE					
8	52700	X	85	4					
9	52800	SAMPLE	NOT	LOCATE					
10	52900	X	180	4					
11	52950	X	50	4					
12	52975	X	55	1					
13	53000	X	25	3					
14	53025	X	30	5					
15	53050	X	55	8					
	53075	X	20	X					
17	53100	X	25	2					
18	53125	X	40	1					

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APPENDIX 3.1

ARMSTRONG CREEK BLOCK

Stream Sediment Data - Heavy Mineral °Series
Fines Analysis Results

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

ARMSTRONG CREEK BLOCK

Sample Number	Creek/River	Location N	Location E	Remarks
9	Tributary of Savage River	06.42	53.61	Gravelly creek bed
10	" " " "	07.43	53.62	Rocky creek bed
11	Alford's Creek	06.88	54.17	" " "
12	Tertiary gravel - in road cutting at Alford's Creek	06.98	54.12	Coarse channel bases
17	Alford's Creek	06.73	53.95	Rocky creek bed
18	Tributary of Armstrong Creek	08.42	52.05	" " "
19	Armstrong Creek	08.52	52.00	" " "
22	Armstrong Creek	10.05	53.10	" " "
23	Kaysers Creek	10.15	53.04	" " "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

ARMSTRONG CREEK BLOCK

Sample Number	Element (ppm)														Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
9	15	5	15	3	x			x	x		45	x			
10	20	5	30	7	x			x	2		60	IS			
11	20	10	25	5	x			x	10		80	IS			
12	55	20	40	6	x			x	62		25	x			
17	10	5	15	4	x			x	17		70	IS			Minor gold
18	40	10	70	4	x			x	10		IS	IS			
19	25	20	65	8	x			x	3		70	IS			Minor gold
22	20	15	35	8	x			x	9		70	IS			
23	30	20	55	x	x			x	x		60	IS			

APPENDIX 3.2

ARMSTRONG CREEK BLOCK

HEAVY MINERALS DETECTED

HEAVY MINERALS DETECTED

ARMSTRONG CREEK BLOCK

HM 23	dominant -	garnet
	minor -	clinozoisite-epidote
	accessory -	actinolite, ilmenite, chromite
	trace -	tourmaline, rutile, monazite, pyrite, limonite, gold, zircon, chlorite, anatase, crossite
HM 12	dominant -	tourmaline
	minor -	chromite, ilmenite, pyrite
	accessory -	cassiterite, monazite, topaz
	trace -	actinolite, zircon, epidote, rutile, garnet, xenotime, andalusite.

APPENDIX 4.1

WHYTE RIVER BLOCK

Stream Sediment Sample Data - Heavy Mineral Series
Fines Analysis Results

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

WHYTE RIVER BLOCK

Sample Number	Creek/River	Location N	Location E	Remarks
21	Tributary of Heazlewood River	01.38	51.40	Rocky creek bed
32	Tributary of Whyte River	97.17	50.29	" " "
33	" " " "	96.85	50.45	" " "
35	" " " "	96.45	50.83	" " "
36	" " " "	96.00	50.95	Coarse creek bed
70	Whyte River	01.35	51.78	Rocky creek bed
71	Heazlewood River	01.38	51.40	" " "
75	Tributary of Heazlewood River	02.90	51.80	Gravelly and rocky
118	Tributary of Whyte River	99.85	50.75	Rocky creek bed
131 *	" " " "	99.10	52.12	" " "
133	" " " "	93.93	50.36	" " " (No HM)
134	" " " "	95.08	50.35	" " " (No HM)
137 *	" " " "	00.33	52.80	" " "
138 *	" " " "	00.43	52.82	" " "
153	Post Office Creek	92.92	51.78	" " "
154	Tributary of Post Office Creek	92.85	51.90	" " "
155	" " " "	92.60	51.74	" " "
156 *	Post Office Creek	92.68	51.28	" " "
157 *	Tributary of Post Office Creek	92.42	51.18	" " "
199	Tributary of Whyte River	97.85	51.16	" " "
200 *	" " " "	97.56	51.50	" " "
201 *	" " " "	97.78	51.52	" " "
202 *	Tributary of Whyte River	97.62	51.70	" " "
203 *	" " " "	97.50	52.10	" " "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

WHYTE RIVER BLOCK

Sample Number	ELEMENT (PPM)														Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
21	15	10	30	x	x			x	9		60	IS			
32	25	10	55	x	x			x	7		60	x			
33	20	15	30	6	x			x	6		75	x			
35	15	10	15	7	x			x	5		75	x			Pyrite
36	20	15	20	9	x			x	5		80	IS			
70	235	25	280	IS		155		x	60	75	150	IS			
71	55	55	115	IS		140			7	30	155	IS			
75	15	15	30	x		15			6	15	120	IS			
118	35	10	75	8		25			32	25	145	x		.015	
131	5	x	10	x	x	10	2		3	5	50	x		x	
133	20	x	50	x		30			10	20	70	x		.003	no HM collected
134	25	20	60	x		25			8	20	120	x		x	" " "
137	25	10	35	4	x	30	2		15	10	120	x		.008	
138	35	x	50	x	x	35	x		9	15	75	x		.002	monazite
153	20	x	25	9	x	20	2		10	5	65	x		.002	
154	10	x	20	11	18	15	2		20	5	15	x			
155	35	x	30	IS	x	20	2		14	5	50	x		IS	
156	20	x	50	4	x	25	2		11	20	100	x		.004	
157	25	5	30	8	x	20	2		22	5	80	x		.012	
199	25	x	40	x	x	25			11	15	315		x	.010	Monazite
200	20	5	40	x	x	20			6	15	279		x	.012	
201	20	5	55	x	x	25			9	20	301		x	.007	
202	15	x	10	x	x	20			11	10	235		x	.002	Monazite
203	10	x	10	x	x	15			5	10	214		x	.006	

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

WHYTE RIVER BLOCK (cont'd)

Sample Number	Creek/River	Location N	Location E	Remarks
204 *	Tributary of Whyte River	97.35	51.92	Rocky creek bed
205 *	" " " "	98.00	52.18	" " "
206 *	" " " "	98.02	52.00	" " "
230	" " " "	90.42	50.97	" " "
231	" " " "	90.58	50.92	" " "
232	" " " "	90.75	51.03	" " "
233	" " " "	90.74	51.30	" " "
234	" " " "	90.55	51.42	" " "
273 *	Tributary of Upper Whyte River	01.05	51.28	Gravelly creek bed
296 *	" " " " "	99.30	50.55	" " "
297 *	" " " " "	99.55	50.45	" " "
298 *	" " " " "	99.70	50.45	" " "
299 *	" " " "	99.80	50.65	" " "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

WHYTE RIVER BLOCK

Sample Number	ELEMENT (PPM) Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	Remarks
204	10	x	10	x	x	15			11	10	240			.022	
205	10	x	10	x	x	15			3	10	244		x	.012	
206	10	x	20	x	x	15			3	10	287			.008	
230	25	x	70	x	x	30			6	30	284		x	.003	
231	25	x	40	x	x	20			9	15	235		x	.004	Minor monazite
232	25	5	90	x	x	30			8	30	339		x	.003	
233	15	x	30	x	12	20			9	15	193		x	x	Minor monazite
234	20	x	35	x	x	20			18	10	238		x	.008	" "
273	15	15	10	x	x	10			4	5	306		x	.005	
296	35	25	105	x	–	30			13	25	364		x	.007	
297	30	10	70	x	–	35			5	35	258		x	.004	
298	15	5	55	x	x	25			7	25	315		x	.010	
299	25	10	145	x	x	35			11	25	413		x	.005	

APPENDIX 4.2

WHYTE RIVER BLOCK

HEAVY MINERALS DETECTED

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HEAVY MINERALS DETECTED

WHYTE RIVER BLOCK

HM 65	major -	tourmaline
	moderate -	topaz
	trace -	cassiterite, zircon, monazite
HM 66	major	ilmenite
	minor	rutile
	trace	cassiterite
HM138*	tourmaline -	topaz, chromite
	minor -	ilmenite, spinel, monazite, pyrite
	accessory -	garnet
	trace	zircon, biotite, amphibole, cassiterite, scheelite, florencite, xenotime.

* denotes contaminated sample

HM 35	major -	pyrite
	trace -	pyrrhotite (detected with magnet)
HM 36	major -	monazite
	minor -	cassiterite
	trace -	rutile, ilmenite
HM 68	major -	tourmaline, topaz
	minor -	monazite
	trace to minor -	cassiterite
	trace -	zircon, ilmenite

HEAVY MINERALS DETECTED

WHYTE RIVER BLOCK

Sample HM138

Major	Tourmaline	Prismatic rounded, fragmental brown, blue, green
	Topaz	Clear, rounded
	Chromite	Rounded to octahedral
Minor	Ilmenite	Manganiferous
	Spinel	(Mg, Al)
	Pyrite	
	Monazite	Yellow, anhedral to euhedral
Accessory	Garnet	Pale pink, dodecahedra to rounded
Trace	Zircon	Euhedral, anhedral clear to pink
	Biotite	
	Amphibole	Tremolite
	Xenotime	Pale yellow subeuhedral
	Cassiterite	Yellow brown, subtransparent
	Florencite	Pink, porcellanous, rounded
	Scheelite	Found with UV.

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APPENDIX 5.1

LUCY CREEK BLOCK

Stream Sediment Sample Data - Heavy Mineral Series
Fines Analysis Results

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

LUCY CREEK BLOCK

Sample Number	Creek/River	Location		Remarks
		N	E	
7	Timbs Creek	92.33	43.80	Rocky creek bed
57	Barren Creek	90.30	48.80	Coarse creek bed
77	Tributary of Whyte River	89.10	48.65	" " "
78	" " " "	89.07	48.45	" " "
81	Owen Meredith River	82.83	44.15	Point bar deposit
82	Paradise River	83.20	44.45	" " "
85	Lucy Creek	85.53	43.05	Gravelly creek bed
86	Nancy Creek	85.05	44.65	" " "
89	Tributary of Whyte River	90.54	47.50	Rocky creek bed
90	" " " "	90.20	47.06	" " "
98*	" " " "	90.82	47.50	" " "
102*	" " " "	91.00	46.83	" " "
103*	" " " "	91.03	47.20	Gravelly creek bed
124*	Tributary of Savage River	95.00	43.73	Rocky creek bed
148	Paradise River	84.47	52.05	" " "
149*	Tributary of Paradise River	84.65	52.20	" " "
150*	" " " "	84.94	51.33	" " "
151	Paradise River	84.72	51.70	" " "
152*	Tributary of Paradise River	84.93	51.75	" " "
159 *	Tributary of Owen Meredith River	81.20	50.00	" " "
160 *	" " " " "	81.30	50.26	No H.M. sample
161 *	" " " " "	81.00	50.48	" "
162 *	" " " " "	81.15	50.70	" "
163 *	" " " " "	81.27	50.62	" "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

LUCY CREEK BLOCK

Sample Number	Element (ppm)														Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
7	130	10	140	x	x			x	5		100	x			Haematite
57	40	x	35	x		25			1		120	x			Minor gold
77	40	5	45	x		30			x	25	130	IS			magnetite
78	35	5	30	x		20			x	20	110	IS			magnetite
81	35	15	60	IS		30			4	20	125	IS			magnetite
82	40	5	60	x		35			2	20	120	IS			magnetite
85	55	15	80	x		35			x	15	100	IS			magnetite
86	85	20	120	x		45			x	40	125	IS			magnetite
89	40	10	60	x		35			x	30	140	IS			
90	90	10	135	x		45			x	50	125	IS			
98	50	15	65	x		40			1	40	180	IS			
102	165	15	120	9		30			x	25	45	IS			
103	35	10	80	x		50			x	40	110	IS			
124	75	x	100	x		60			2	40	100	x		.002	Magnetite
148	15	x	20	4	x	10	x		5	5	75	x		x	
149	10	x	20	3	x	15	x		8	5	80	x		.008	
150	20	x	25	x	x	20	2		6	5	100	x		.002	
151	15	x	20	x	x	20	x		5	5	95	x		.005	
152	10	x	15	5	x	15	x		5	5	70	x		.075	
159	25	x	35	x	x	20	2		4	10	95	T		.061	
160	10	x	25	x	x	20	2		11	10	75	x		x	
161	30	5	35	3	x	20	2		5	5	100	x		.030	
162	10	x	20	x	x	20	2		5	5	75	x		x	Minor Pyrite
163	20	x	30	x	x	20	2		3	5	8	x		x	Minor gold

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

LUCY CREEK BLOCK (cont'd)

Sample Number	Creek/River	Location		Remarks
		N	E	
164 *	Paradise Creek	81.95	51.75	No H.M. Sample
165 *	Tributary of Paradise River	82.66	52.55	" "
166 *	" " "	82.58	52.50	" "
167 *	" " "	84.98	51.05	" "
168	Paradise River	84.86	50.30	" "
169	Tributary of Paradise River	84.72	50.32	" "
170 *	" " "	84.62	50.23	" "
171 *	Lucy Creek	86.63	47.00	Gravelly creek bed
172 *	Tributary of Paradise River	86.32	48.50	Rocky creek bed
173 *	Breakneck Creek	86.80	48.83	" " "
174 *	Tributary of Breakneck Creek	86.98	48.70	" " "
175 *	Tributary of Whyte River	87.46	47.68	Gravelly creek bed
176 *	Lucy Creek	86.93	48.00	Rocky creek bed
180	Owen Meredith River	80.85	48.78	" " "
211 *	Tributary of Whyte River	87.90	47.16	Gravelly creek bed
212 *	" " "	87.98	47.25	" " "
213 *	Tributary of Lucy River	85.08	47.20	" " "
214 *	" " "	85.93	46.78	Rocky creek bed
215 *	Lucy Creek	86.05	46.75	" " "
216 *	Tributary of Paradise River	85.80	48.36	" " "
217 *	" " "	83.80	47.12	gravelly/rocky creek bed
218 *	" " "	83.83	47.23	" "
219 *	Paradise River	83.75	47.30	" "
222 *	Doctors Creek	82.04	47.53	" "

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

LUCY CREEK BLOCK (cont'd)

Sample Number	Element (ppm)														Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
164	10	x	20	x	x	15	2		10	5	70	T		x	
165	30	x	30	x	x	15	2		2	5	80	x		.084	
166	10	x	15	x	x	30	2		1	5	70	x		x	
167	30	x	35	x	10	20	2		5	5	90	x		.003	
168	20	x	25	x	x	15	x		3	5	70	x		.002	
169	25	x	25	IS	x	15	2		3	5	95	x		IS	
170	15	x	20	x	x	15	x		4	5	90	x		.012	
171	20	x	85	x		15			x	5	25	x		.004	
172	10	x	10	x		15			1	5	35	x		.003	
173	25	x	25	x		20			1	5	40	T		.002	
174	15	x	30	x		30			1	10	55	x		.003	
175	45	x	35	19		20			1	5	35	x		IS	Minor gold
176	10	x	5	x		15			x	5	35	x		.002	
180	25	x	45	x	x	20	2		12	10	80	x		–	Minor pyrite
211	20	x	65	x	x	50			3	25	105		x	.004	
212	35	x	35	x	x	25			2	15	257		x	.012	
213	20	x	20	x	x	15			2	10	104		x	.004	Tourmaline
214	15	x	25	x	x	20			1	10	168		x	.003	"
215	20	x	35	x	x	35			2	20	236		x	.003	"
216	10	x	20	x	x	30			2	15	376		x	.004	"
217	45	x	30	x	x	35			3	45	254		x	.010	Magnetite
218	10	x	20	x	x	30			2	20	217		x	.002	"
219	20	5	30	x	x	20			6	15	224		x	.004	"
222	60	5	115	x	x	45			8	40	339		x	.003	"

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES

LUCY CREEK BLOCK (cont'd)

Sample Number	Creek/River	Location		Remarks
		N	E	
225	Tributary of Paradise Creek	83.80	49.80	Rocky creek bed
226	Paradise Creek	83.58	49.83	" " "
229	Tributary of Paradise Creek	84.32	49.90	" " "
286 *	Tributary of Owen Meredith River	82.05	45.40	Gravelly creek bed
287 *	Owen Meredith River	82.00	45.45	" " "
288 *	" " "	81.50	45.95	" " "
289 *	Tributary of Owen Meredith River	81.45	46.00	Rocky creek bed

STREAM SEDIMENT SAMPLE DATA - HEAVY MINERAL SERIES
FINES ANALYSIS RESULTS

LUCY CREEK BLOCK (cont'd)

Sample Number	Element (ppm)														Remarks
	Cu	Pb	Zn	Sn	W	Ni	Mo	Ag	As	Co	Ba	Au	Bi	Au	
225	20	x	35	x	x	20			6	10	245		x	.002	
226	25	x	25	x	x	15			5	10	218		x	.004	
229	15	x	25	x	x	15			5	10	153		x	.002	
286	50	10	70	x	–	60			1	35	355		x	.003	
287	30	20	45	x	–	30			4	20	378		x	.003	
288	30	10	55	x	–	30			4	20	365		x	.004	
289	50	15	90	x	–	45			5	50	437		x	.005	

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COPY

233169

The Australian
Mineral Development
Laboratories

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Please address all
correspondence to
P.O. Box 114 Eastwood
SA 5063
In reply quote: GS3/62/0

amdel

7 June, 1982

D. of M.	A.O.	C.G.	E.O.
D. DIR.	15 MAR 1985 DEPT. OF MINES		
REF. No 2659/85			

Industrial & Mining Investigations,
46 St. John Street,
LAUNCESTON, Tasmania 7250

REPORT GS 5944/82

YOUR REFERENCE: Sample advice request of 4/5/82

MATERIAL: Three rock samples

LOCALITY: Little Donaldson River Area

IDENTIFICATION: Nos 1004, 1005 & 1006

DATE RECEIVED: 7/5/82

WORK REQUIRED: Thin section preparation, detailed petrographic description and discussion of points indicated.

Investigation and Report by: Don McColl

Chief - Geological Services Section: Dr Keith J. Henley
Manager, Mineral and Materials Sciences Division: Dr William G. Spencer

Alan Webb

Acting Chief
Geological Services Section
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mhb/4

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PETROGRAPHY OF THREE SAMPLES

Sample: 1004; TSC36328; PSD7120

Rock Name:
Pyritic grey and black laminated slate.

Hand Specimen:
A dark grey slate with a strongly developed cleavage, and two lighter grey bands indicating bedding at an angle of about 45° to the cleavage. A concentration of pyrite layers can be seen within these bands, which are approximately 1 cm and 2 cm thick respectively.

Sawn Surfaces:
The specimen was sawn in two directions preparatory to sectioning. When these surfaces were examined wet under low power microscopy, textures became visible in the paler grey shale band. Mainly these were visible in the more westerly part of the 1 cm band, which was apparently slightly coarser and relatively nonpyritic by comparison to the remainder of these bands. The observations made were as follows, (1) there is some evidence of ripple marking, with points of crests facing west to suggest that the lower part of the sequence is toward the east. i.e. The sequence is the right way up.

(2) Cut and fill structures and possibly ?current grooves were noted. These have left lenticles of slightly coarser material. These have their most convex surfaces toward the east, and are most planar or flattened toward the west, hence if the structure is interpreted in terms of current bedding the sequence is the right way up, that is the older rocks are towards the east.

(3) No really clear truncation of bedding to give a definite indication of facing was seen. Some lenses seem to truncate to the east and some to the west. This may simply be a confused type of festoon cross bedding.

(4) There is no definite indication of graded bedding. Within the narrower grey shale band the coarsest grained material is to the west which would suggest that the sequence was upside down. It is clear however that this is not a graded bed and the situation of the coarser material may simply be due to intraformational reworking of the sediment.

Thin and Polished Sections:
A visual estimate of the constituents is as follows:-

	%
Quartz	30
Sericite (and clay minerals)	~50
?Chlorite	~10
Carbonaceous material (?graphite)	5
Hematite	1
Pyrite	3-5

The microscopic details of this rock are dominated by the metamorphic foliation which overrides most of the relict sedimentary textures. Aligned angular silt-sized (up to 50 μm) grains of quartz are disseminated throughout a finely aggregated sericite-clay matrix with possibly some chlorite. Sericitisation of the clays is fairly well advanced, with some fine consolidation crumpling of the micas around the more competent quartz grains. This has taken place at fairly large angles to the sedimentary laminations which have consequently lost much of their finer detail. The sericite merges into flaky foliae of ?muscovite which may in part be of detrital origin, and have consequently become partly aligned with the slaty cleavage and partly with the sedimentary layering.

The darker grey-black slate bands contain a more abundant intergranular pigmentation of opaques, which are rather too fine for optical resolution, but are almost certainly carbonaceous and probably also graphitic. In the section area this black slate is also spotted with random but aligned lenses of cherty quartz up to 2 mm long and 0.5 mm wide, which could have developed from random feldspathic pyroclasts.

The main opaque mineral is pyrite, which occurs as medium sized clusters of subidiomorphic crystals clustered within the cherty lenticular inclusions, individual crystals being up to 0.1 mm diameter, or as masses of even finer single crystals parallel to the sedimentary banding. The pyrite is most abundant in the grey slate bands where it follows the bedding layers and individual crystals may be as large as 0.5 mm diameter. Some tectonic distortions of these relict bedding layers do occur parallel to the cleavage direction, such as drag-folding and minor brecciation suggesting some movement.

The rock is a siltstone or slate with probable pyroclastic contamination in some layers. It has been produced by relatively unsorted deposition of rapidly-formed fine sediments in a medium depth intermittingly an arobic environment. Mild greenschist facies metamorphism has imparted the foliation, these changes however may be due in part to diagenetic changes accompanying consolidation of the original sediment.

Discussion:

Loss of detail and confusion of the sedimentary textures has undoubtedly taken place during the tectonism, however the following two effects are difficult to entirely separate, (1) intraformational slumping, crumpling and grooving during consolidation and diagenesis prior to induration. (2) Strain-slip cleavages, drag-folds and sericitic recrystallisation effected during metamorphism. The following comments are offered in response to your questions, (a) there is no definite evidence of graded bedding, which was probably not present at any stage. (b) There is some conflicting evidence in respect to the facing of the beds, it is the author's opinion however, that they are the right way up, i.e. older beds to the east, younger to the west. (c) The pyritic grey slate bands are a primary sedimentary feature which was probably crystallised during diagenesis, and modified very slightly during subsequent metamorphism. (d) No traces of base metal sulphides other than pyrite were observed, however it is believed that trace geochemical analysis would give a more reliable indication. (e) The evidence of this single carbonaceous shale contaminated with ?pyroclastic, seems rather tenuous evidence on which to postulate a base metal deposit, nevertheless rocks of this type were found at Mt. Isa and McArthur River. The general geological evidence in this respect is considered more likely to be of significance.

Sample: 1005; TSC36329

Rock Name:
Carbonaceous shale (?phyllite).

Hand Specimen:
A dark grey-black slate with a strongly developed cleavage, and probable carbonaceous pigmentation.

Thin Section:
A visual estimate of the constituents is as follows:-

	%
Quartz (including chalcedony)	∿40
Clay mineral	10-20
Carbonaceous material (?graphite)	∿40
?Iron oxides	∿5

Much of the detail in this rock is obscured and even the proportions of the components are difficult to discern among the heavy black opaque pigmentation which is probably carbonaceous in nature. Grains of quartz and even more common chalcedonic intergrowths are scattered throughout. These show quite an array of unusual shapes. Many are globular to spherical which would be appropriate if they were developed from vitreous volcanic droplets, but others consist of partial or complete rings of silica, which are reminiscent of a fossiliferous replacement. Some also show irregular drawn-out shapes and points which are typical of vitreous shards. The probability of at least some pyroclastic content seems very high. Unlike sample 1004 this contains no sericite, and even clay minerals do not appear as abundant. The pigmentation effectively obscures such relatively non-prominent minerals as clays and chlorite, which could be far more abundant than indicated. No sulphides can be seen in the rock even in oblique illumination, but there are faint suggestions that iron oxides are present and are concealed by the carbonaceous matter.

There is no definite evidence of facing or graded bedding in this rock, although minor transverse faults are shown up by slight changes in the density of the pigmentation. It is assumed to be a fine-grained tuffaceous argillite from a quiescent anaerobic environment, which has been affected by minor diagenetic tectonism and silicification, but negligible metamorphism.

Sample: 1006; TSC36330

Rock Name:
Carbonatised phyllitic tuff.

Hand Specimen:
A pale grey-green fragmental igneous rock with a weak metamorphic foliation or cleavage.

Thin Section:
A visual estimate of the constituents is as follows:-

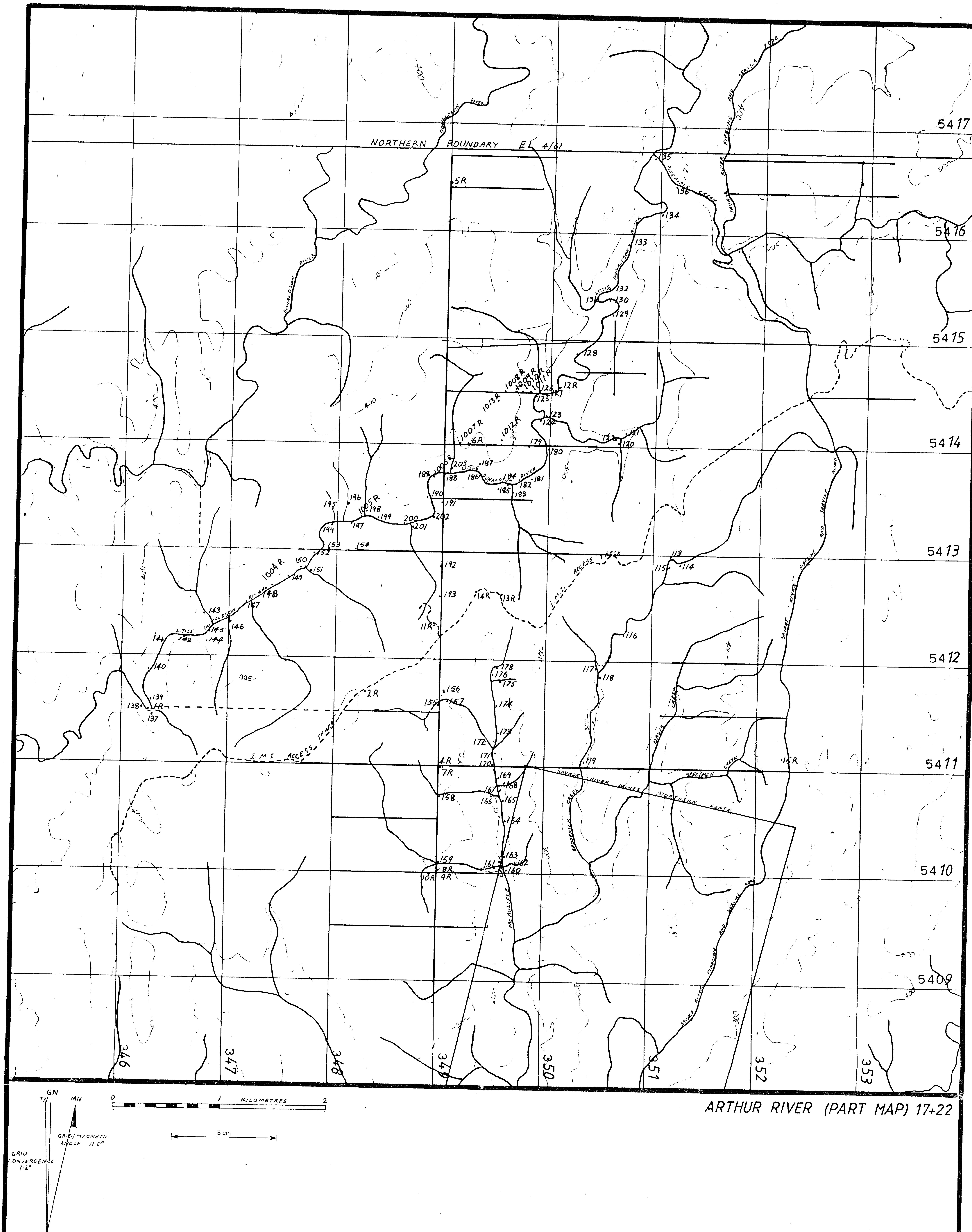
	%
Quartz	10-20
Amphibole (?actinolite)	20
Sericitic clay minerals	~50
Carbonate (calcite)	10-15
Opaques (?sulphide)	1
Limonite	2
Feldspars	trace

This is a fragmental igneous rock in which pyroclasts of varied size and composition are set in a very fine-grained matrix. There is a general elongation and parallel alignment of most of the fragments, with a weakly defined metamorphic foliation throughout the groundmass. Most fragments are moderately well defined however, and although most relict textures have been destroyed, the variety of materials can be inferred from their present composition. Some consist almost entirely of cherty or chalcedonic quartz with coarser blastoporphyritic areas in a finer groundmass indicating fragments of a quartzo-feldspathic porphyry. Others consist of a random bladed mesh of ?actinolite amphibole with various proportions of chalcedonic quartz apparently derived by silicification of mafic lavas. Other susceptible fragments have been partly or completely replaced by granular calcite, which is also spotted throughout the groundmass. A few have recrystallised as a virtually solid mass of sericite, possibly produced by hydrolytic alteration of feldspar grains during the introduction of carbonate. Rare traces of residual feldspar are indicated by staining tests on the hand specimen.

The degree of metamorphism is very slight and is indicated only by the sericitisation and foliation of the groundmass, and the formation of actinolite both in the pyroclasts and as rare single prisms in the groundmass. This is indicative of no more than middle to lower greenschist facies, and is in all probability complicated by the ?volcanogenic mineralising fluids which have introduced the calcite, and brought about general silicification of the rock. A spotting of opaque sulphides disseminated through the groundmass probably also dates from this alteration.

The rock has obviously been derived from a fragmental pyroclastic such as a tuff or volcanic breccia. It has a very wide range of fragment compositions, and has been subjected to hydrolytic alteration and calcitic and sulphide mineralisation during late stage deuteric volcanism. Simultaneously and/or subsequently it was metamorphosed and foliated to a mild degree, which is not appreciably distinguishable from other rocks in this sequence. The one distinct difference between this rock and all others in the suite is the hydrolytic alteration and calcite mineralisation.

PLAN 1·3



ARTHUR RIVER (PART MAP) 17+22

R denotes Petrological sample or rock chip

INDUSTRIAL & MINING INVESTIGATIONS PTY LTD	
McAULIFFE Ck, LITTLE DONALDSON RIVER, AREA	
PIPELINE ROAD AREA EL 4/61 SAMPLE LOCATIONS	
STREAM MUDS, PETROLOGICAL SPECIMENS, ROCK CHIPS	
AUTHOR H SHANNON DRAWN P COVER	SCALE 1:20,000
	JUNE 1982

85 - 2332

3424

233174

MAP INDEX

Part 1 Badger Plains Block

1.1 Sample Locations

1.2 Cu, Zn, Pb Assay Values, LD & DS Series Silt Samples

1.3 Geology - Field Observations, Magnetics

1.4 Geology - Interpretation

2.1 Soil Geochemistry - Sample Locations

4.1 Waterfall Creek - Geochemical Sampling, Sample Locations

4.2 Waterfall Creek - Geochemical Sampling, Copper Analysis Values

4.3 Waterfall Creek - Geochemical Sampling, Lead Analysis Values

4.4 Waterfall Creek - Geochemical Sampling, Zinc Analysis Values

4.5 Waterfall Creek - Geochemical Sampling, Arsenic Analysis Values

6 Little Savage River Area, Diamond Search Project, Geology and Sample Locations

Part 2 Broderick Creek Block

1.1 Sample Locations

1.2 Cu, Zn, Pb Assay Values in L.D. Series Silt Samples

1.3 Geology - Field Observations

1.4 Geology - Interpretation

2 Soil Geochemistry - Sample Locations

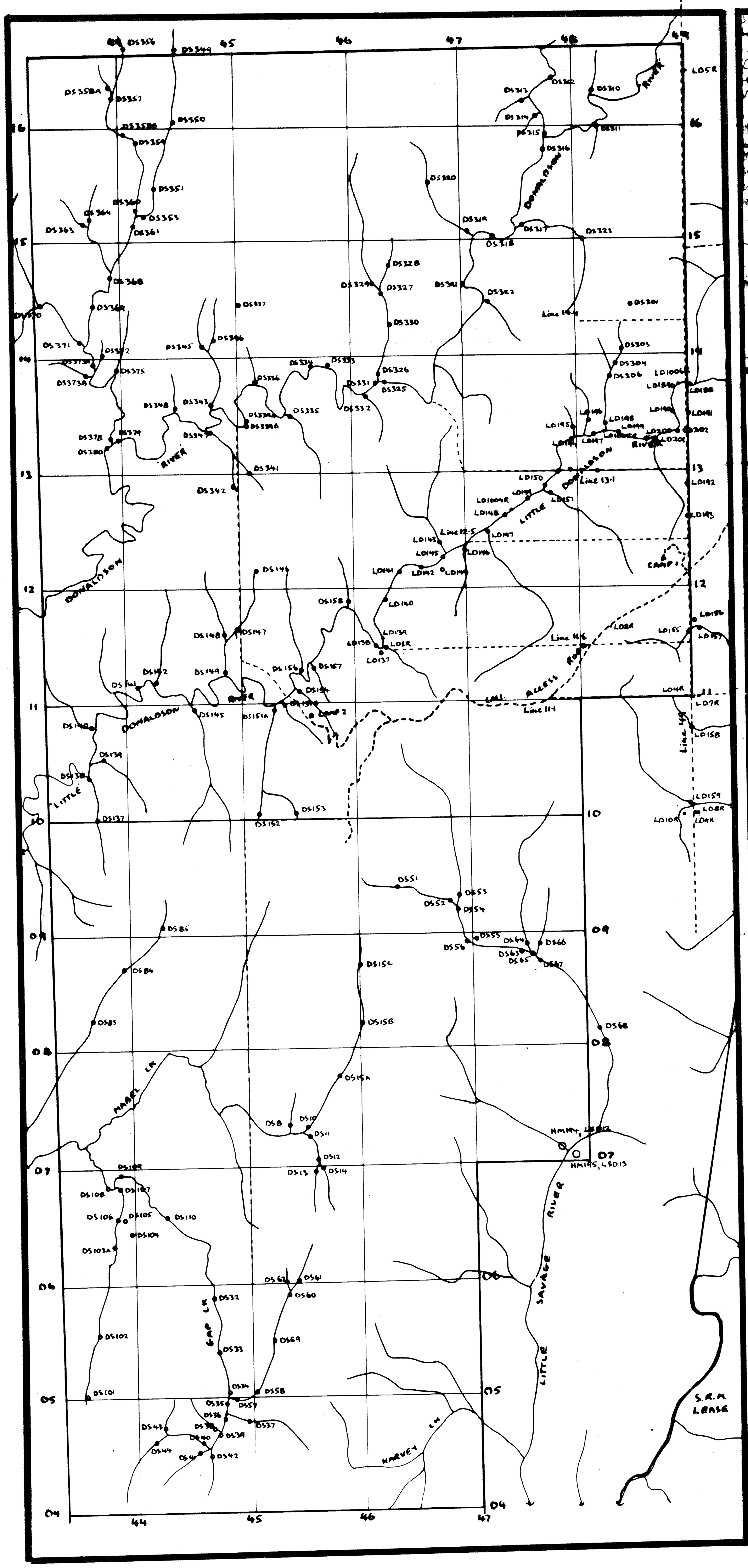
Part 3 Armstrong Creek Block

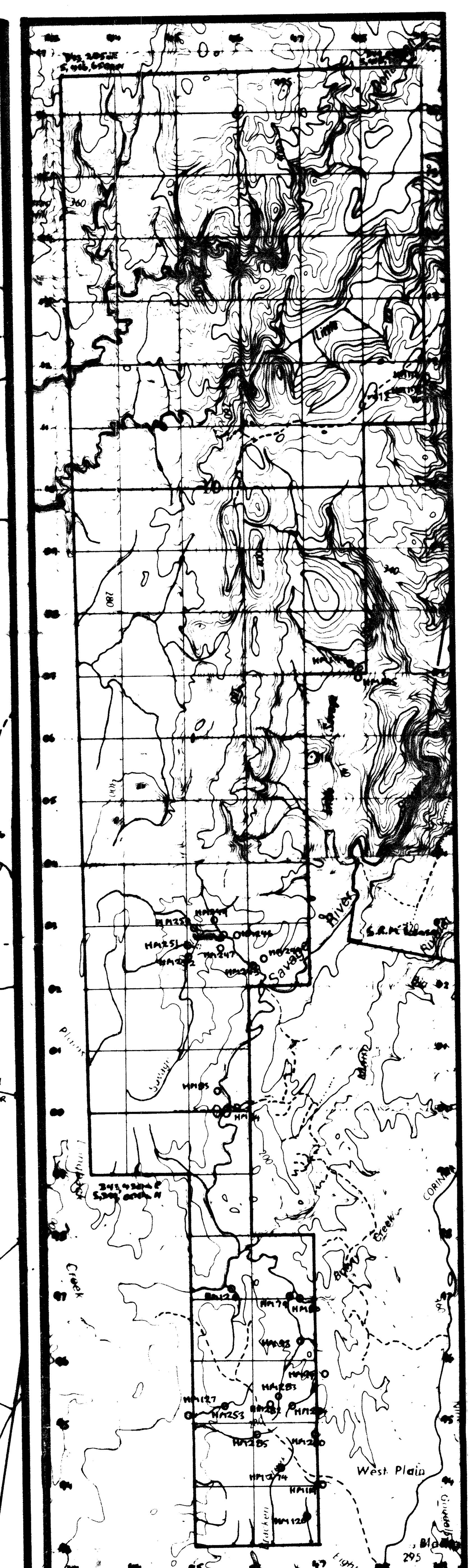
1.1 Sample Locations

1.2 Geology - Field Observations, Magnetics

1.3 Geology - Interpretation

MAP INDEX (Cont'd)





MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Clearing suitable for helicopter
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- 30° Dip of strata

85-2332
(Vol 2 of 2)

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BADGER PLAIN BLOCK.

PLAN 1.1: SAMPLE LOCATIONS

DATA COLLECTED: Silt bank samples: L.D.series 1981-82; H.S.; D.S. series 1982-83; L.V.,M.E. 310-380,51-68; remainder H.S. Soil samples: 1981-82; Line 49, 25m samples, Lines 11.1, 11.6, 13.1: H.S.;Line 49, 50m samples, J.W. 1982-83; Lines 11.0, 11.2, 11.3, 14.4: L.V.,M.E. Details Plan 2.1

COMPILED AND DRAWN: H.S.

SCALE 1:20,000 (North); 1:50,000 (Whole area map)

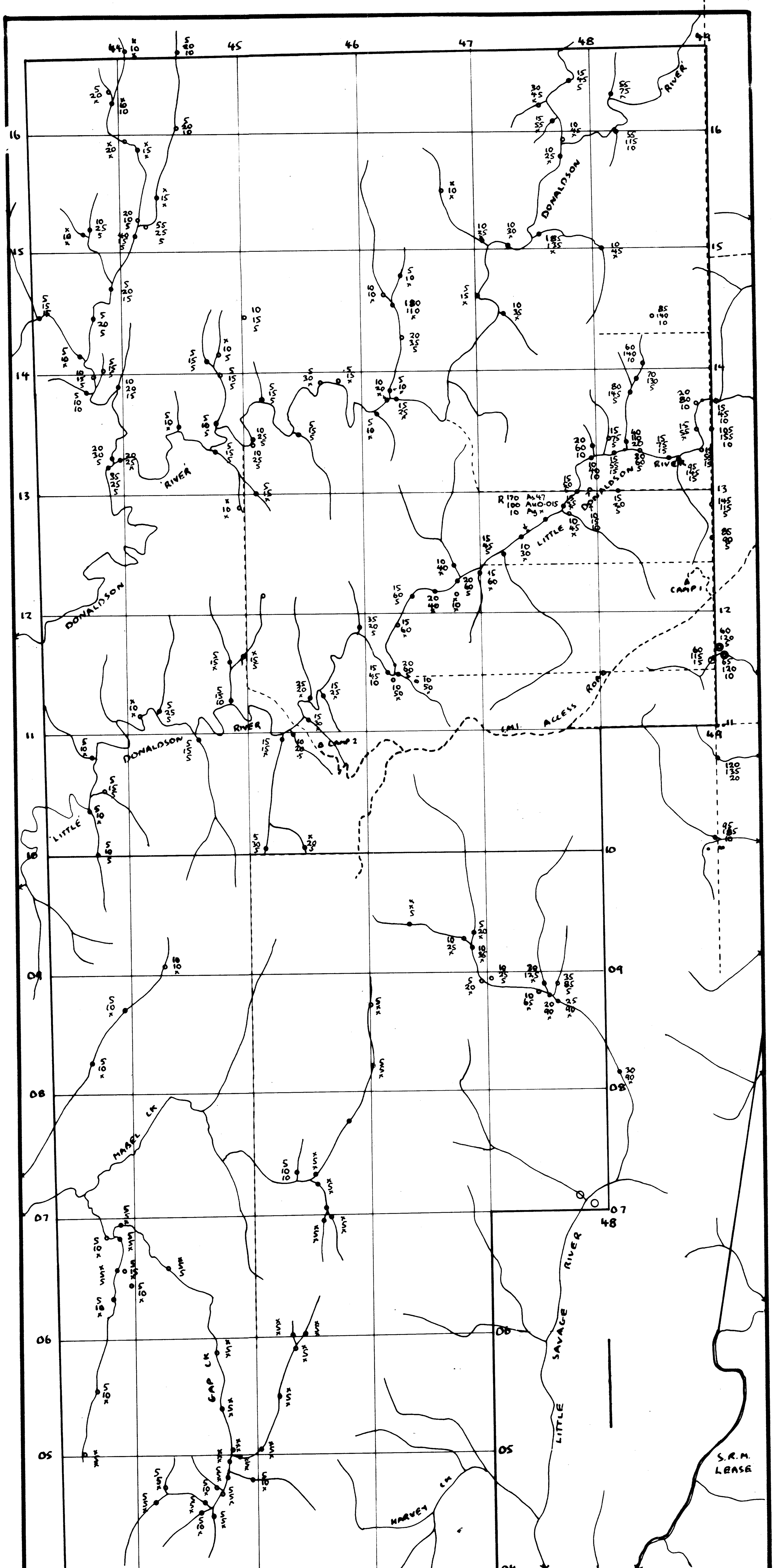
233177

January 1985

Plan ref. IMI EL4/61 1/85-1

5 cm

3425



MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Clearing suitable for helicopter
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- Dip of strata

85-2332
(Vol 2 of 2)

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BADGER PLAIN BLOCK.

PLAN 1.2: Cu, Zn, Pb ASSAY VALUES, L.D. AND D.S. SERIES SILT SAMPLES

COMPILED AND DRAWN: H.S.

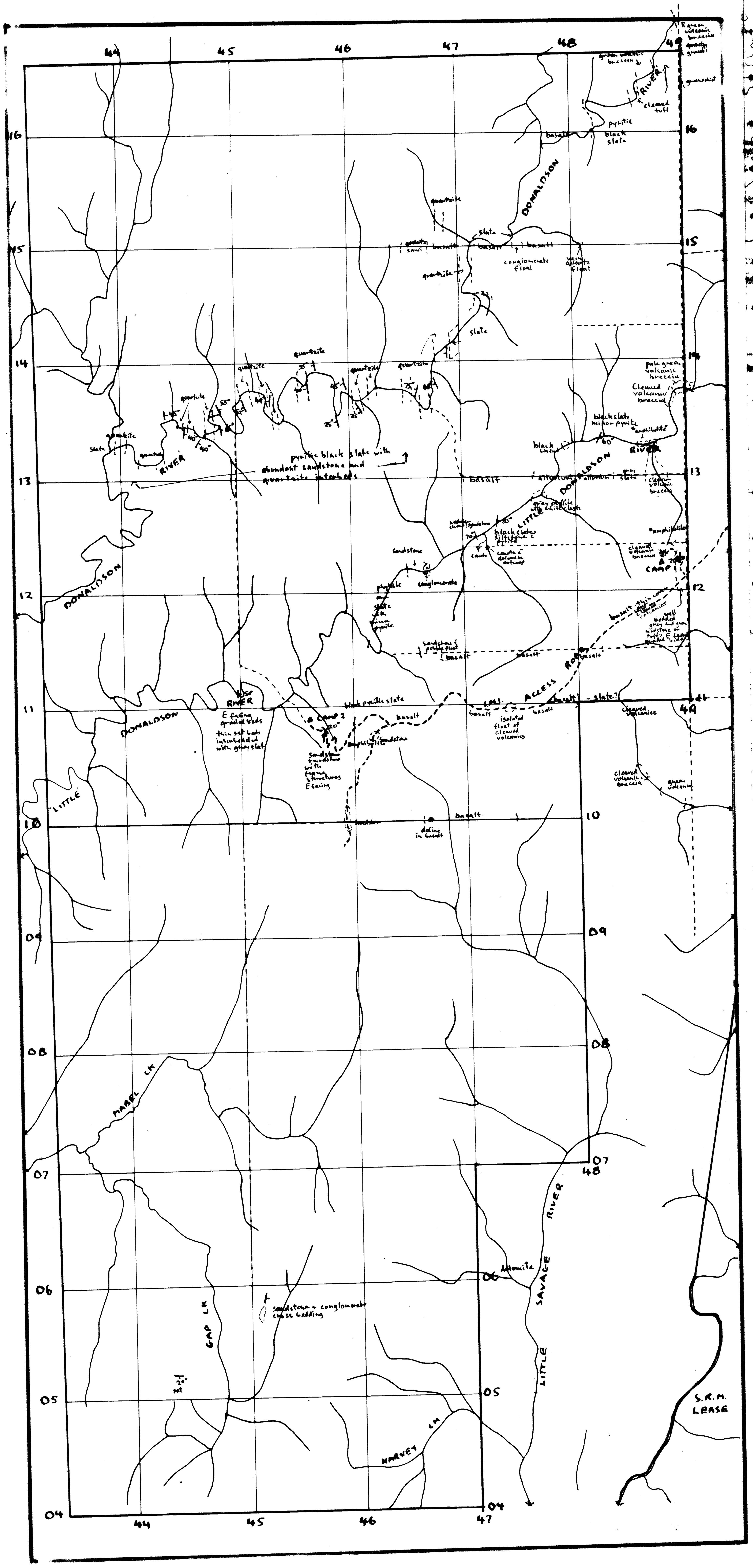
SCALE 1:20,000 (North); 1:50,000 (Whole area map)

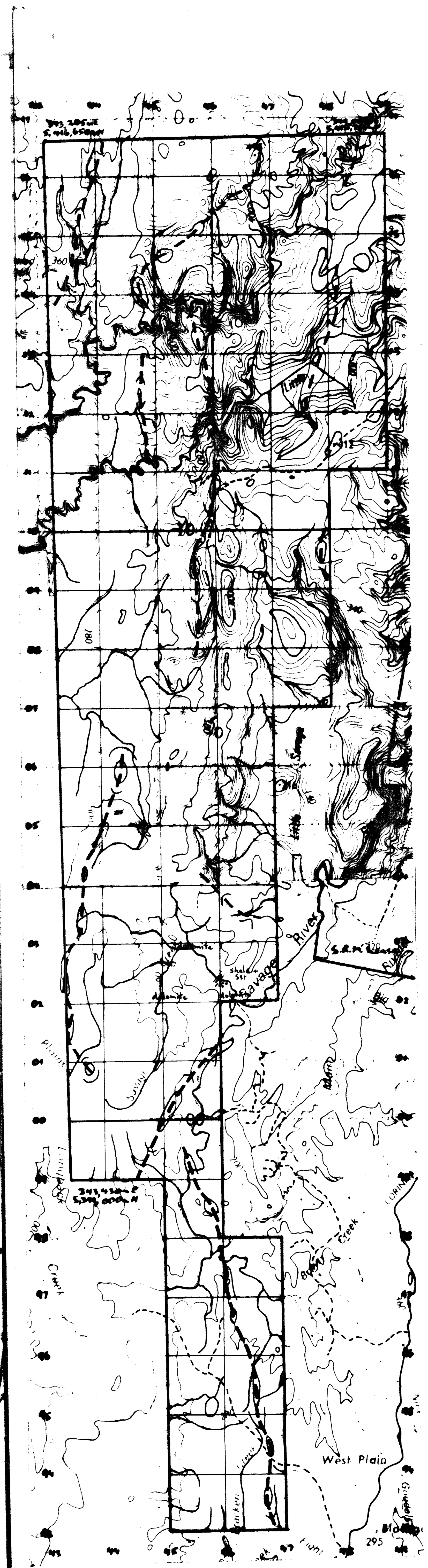
January 1985

5 cm

Plan ref. IMI EL4/61 1/85-2

3426





MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Clearing suitable for helicopter
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- Dip of strata
- Axis of magnetic high
- Magnetic contour

85-2332
(Vol 2 of 2)

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BADGER PLAIN BLOCK.

PLAN 1.3: GEOLOGY - FIELD OBSERVATIONS, MAGNETICS.

DATA COLLECTED: Donaldson section: L.V.,M.E.; other outcrop notes: H.S.; Magnetic data from Mines Dept. survey 1981 interpreted H.S. for axes.

COMPILED AND DRAWN: H.S.

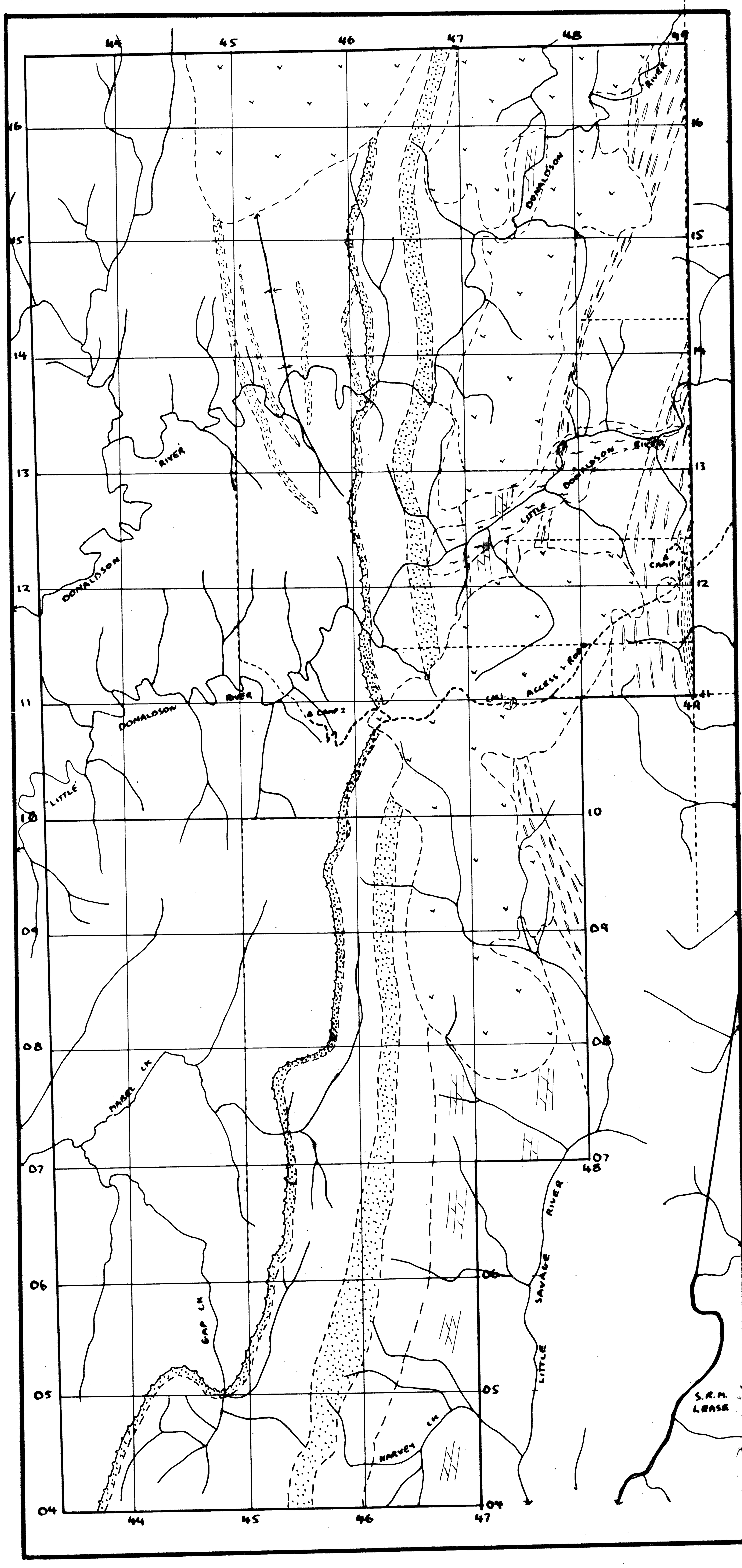
SCALE 1:20,000 (North); 1:50,000 (Whole area map) 5 cm

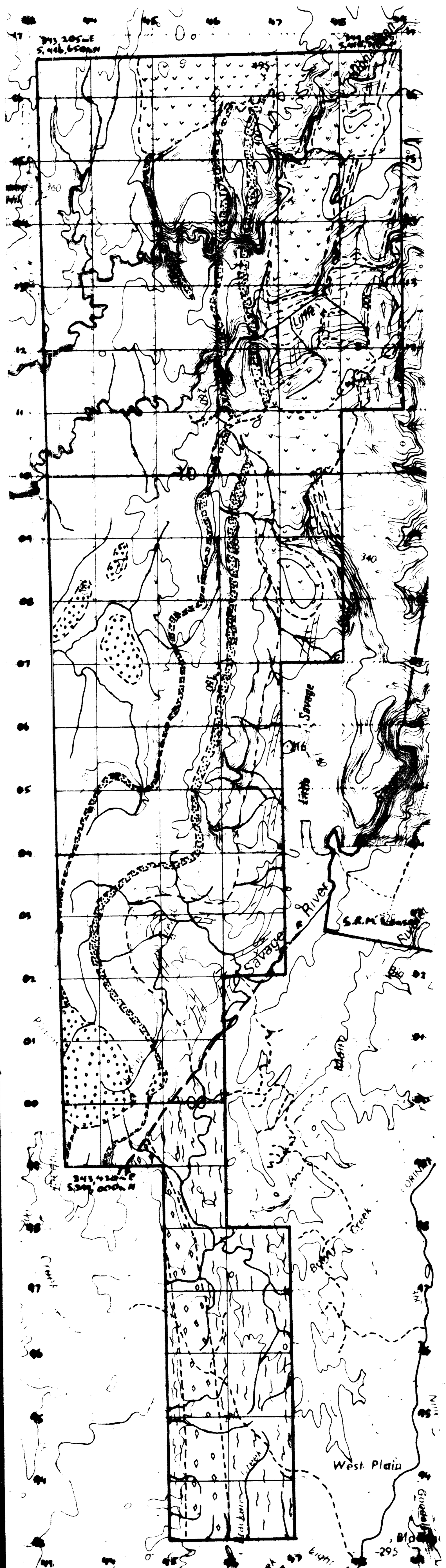
January 1985

Plan ref. TMI EL4/61 1/85-3

3427

233179





MAP KEY

Formed road

Rough track

Cut line - walking track

Clearing suitable for helicopter

Large river

Other watercourse

Stream sediment sample point

Tenure boundary

Grid - Australian Map Grid

Geological boundary

Fault

Dip of strata

QUATERNARY: Alluvium

TERTIARY: "Brown Plain Formation"
Poorly rounded oligomictic pebble to cobble gravel and sand.

Basalt

PRECAMBRIAN: "Whyte Group"

"Battys Bend Formation"
grey and green basal mudstone, labile sandstone, phyllite, greenschist, turbidite sandstone, minor carbonates. Lithologies indicated:-

greenschist, etc.

quartz rich greenschist

mudstone

"Longback Formation"
sandstone/conglomerate; slate; dolomite; fragmental and massive volcanics. Lithologies indicated:-

Volcanics

Slate

Dolomite

Sandstone and Conglomerate

Rocky Cape Group
slate with sandstone

prominent sandstone bed

85-2332
(Vol 2 of 2)

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BADGER PLAIN BLOCK.

PLAN 1.4: GEOLOGY - INTERPRETATION

PHOTOINTERPRETATION BY H.SHANNON.

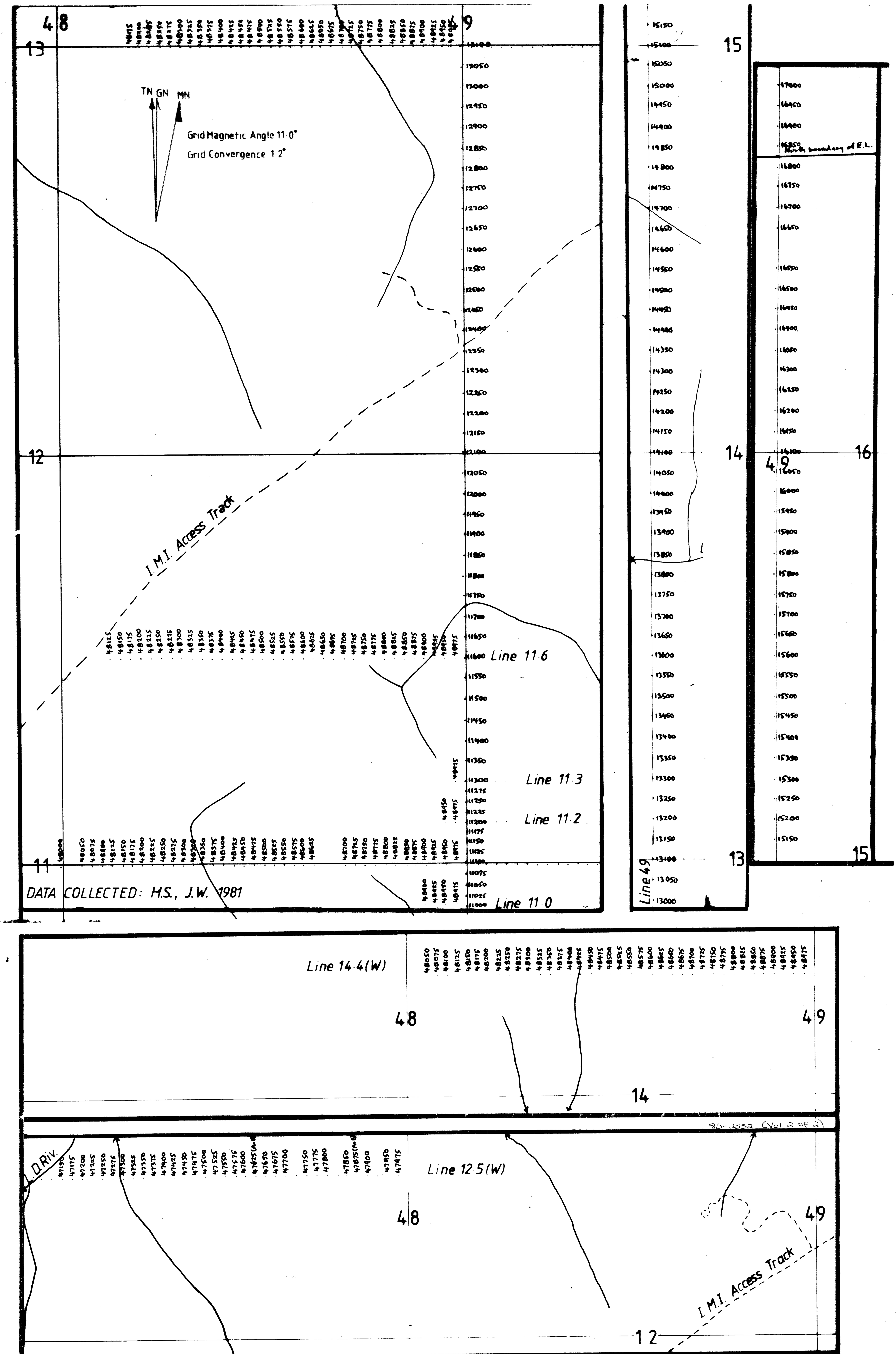
5 cm

COMPILED AND DRAWN: H.S.

SCALE 1:20,000 (North); 1:50,000 (Whole area map)

January 1985

Plan ref. IMI EL4/61 1/85-4



INDUSTRIAL AND MINING INVESTIGATIONS P/L
E.L. 4/61 NORTHERN AREA

SOIL GEOCHEMISTRY SAMPLE LOCATIONS

BADGER PLAIN BLOCK

DATA COLLECTED BY M.EDWARDS, L.VANZINO 82/83
DRAWN: H.SHANNON
COMPILED L. VANZINO OCTOBER 1984

200 100 0 500m

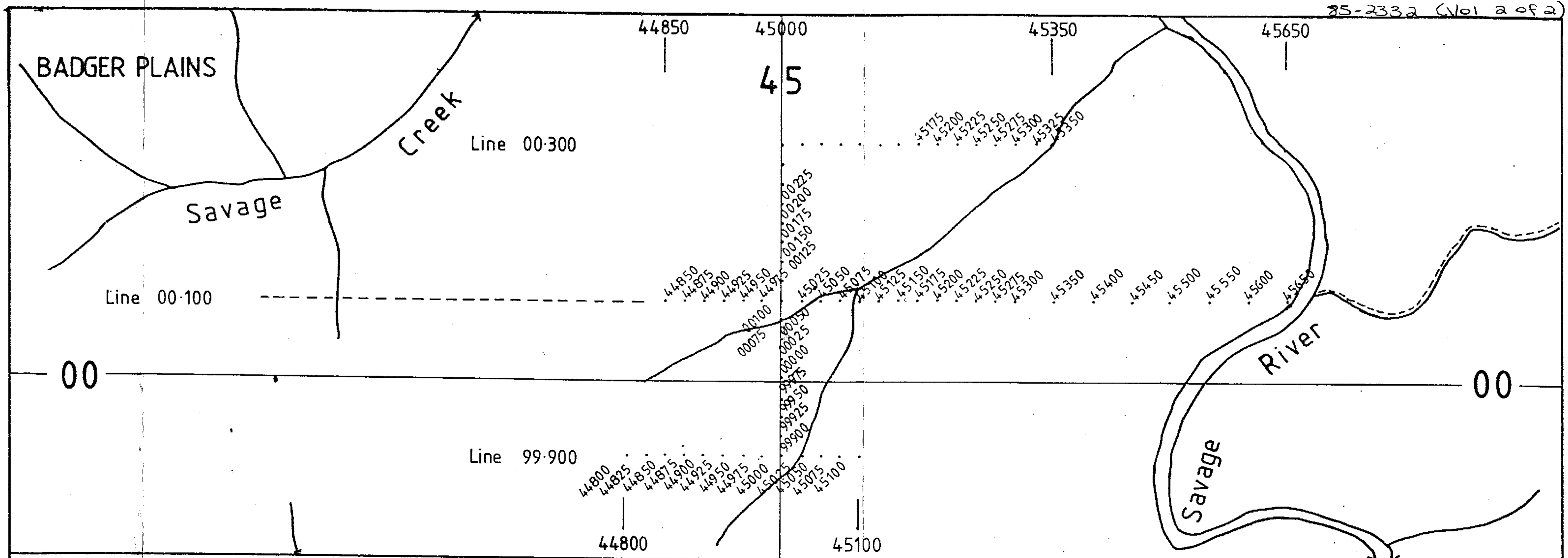
1:5,000

PLAN 2·1

3429

233181

85-2332 (Vol 2 of 2)



LEGEND

creek

foot track

soil sample

—00— grid lines AMG

G N

TN 1·2°

MN 11·0°

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.
E.L. 4/61 SAVAGE RIVER

WATERFALL CREEK GEOCHEMICAL SAMPLING SAMPLE LOCATIONS

DATA COLLECTED : L. Vanzino

COMPILED : L. Vanzino

DRAWN : H. Shannon

PLAN 4·1

233182

200 100 0 500m

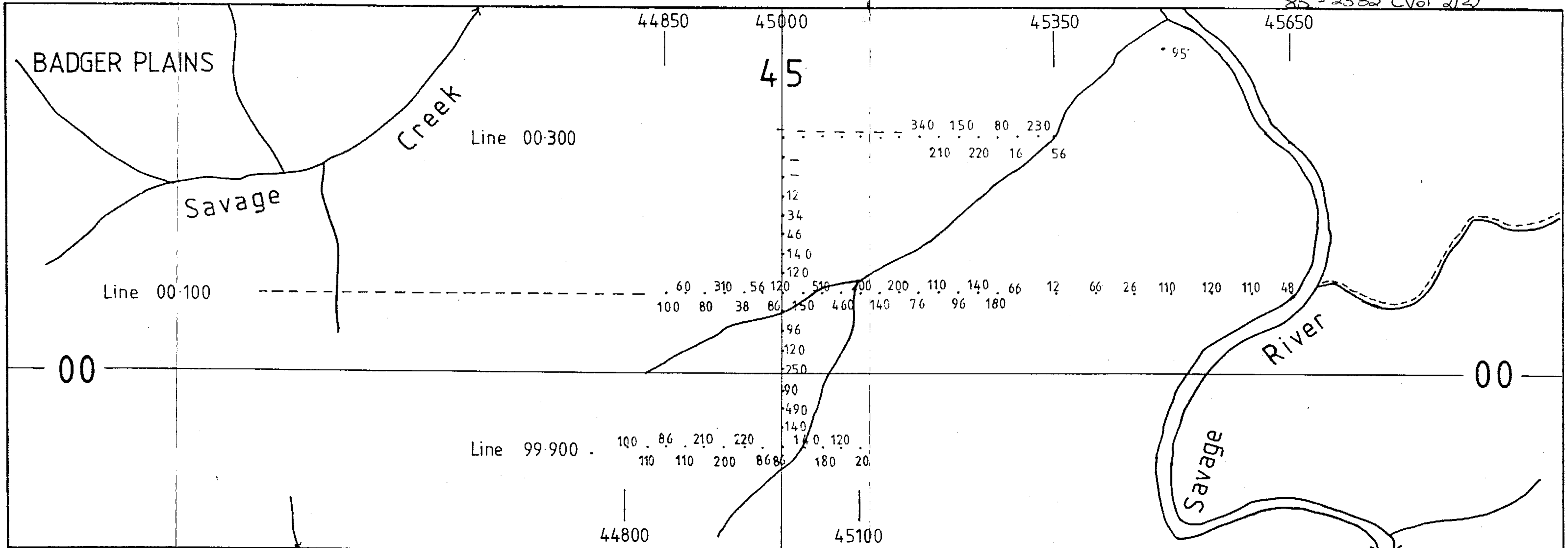
5 cm

Scale 1 : 5,000

June 1984

3430

85-2332 CVol 2/2)



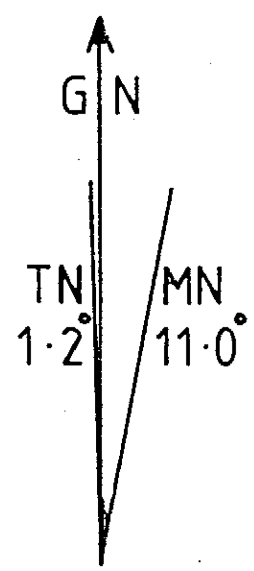
LEGEND

creek

foot track

soil sample (p.p.m.)

—00— grid lines AMG



INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.
E.L. 4/61 SAVAGE RIVER

WATERFALL CREEK GEOCHEMICAL SAMPLING COPPER ANALYSIS VALUES

DATA COLLECTED : L. Vanzino

COMPILED : L. Vanzino

DRAWN : H. Shannon

PLAN 4·2

233183

5 cm

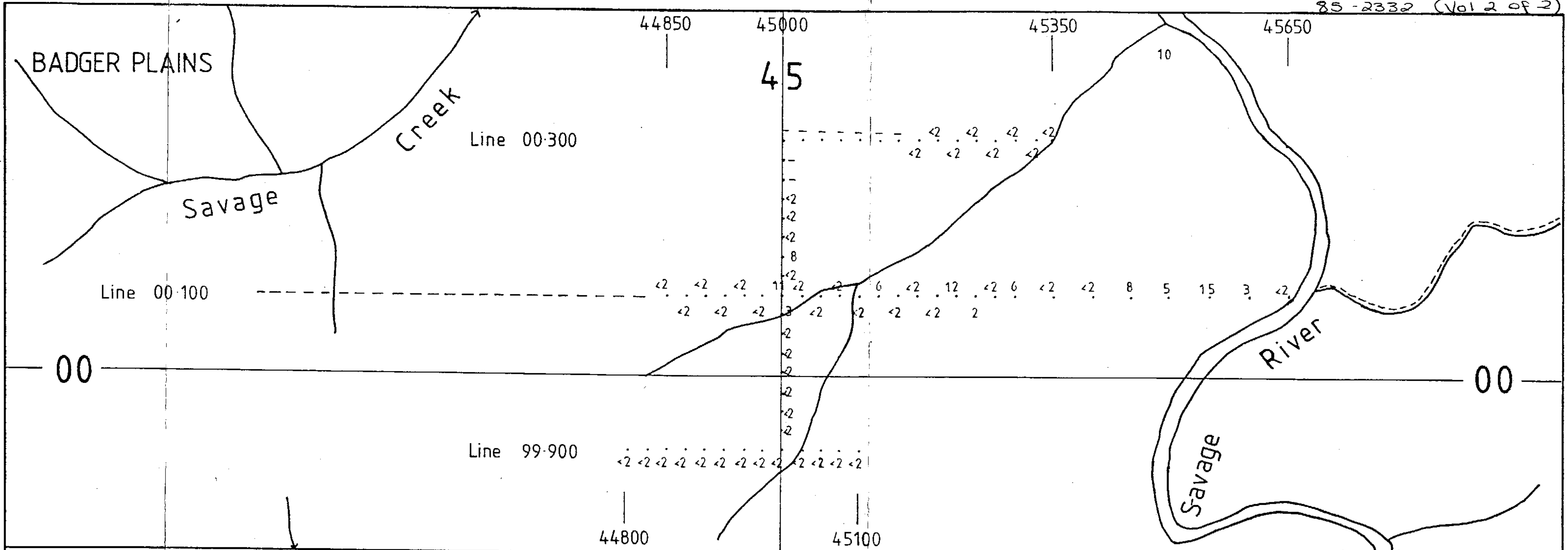
200 100 0 500m.

Scale 1 : 5,000

June 1984

3431

85-2332 (Vol 2 of 2)



LEGEND

creek

foot track

soil sample (p.p.m.)

—00— grid lines AMG

GN

TN 1·2°

MN 11·0°

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.
E.L. 4/61 SAVAGE RIVER

WATERFALL CREEK GEOCHEMICAL SAMPLING LEAD ANALYSIS VALUES

DATA COLLECTED : L. Vanzino

COMPILED : L. Vanzino

DRAWN : H. Shannon

PLAN 4·3

5 cm

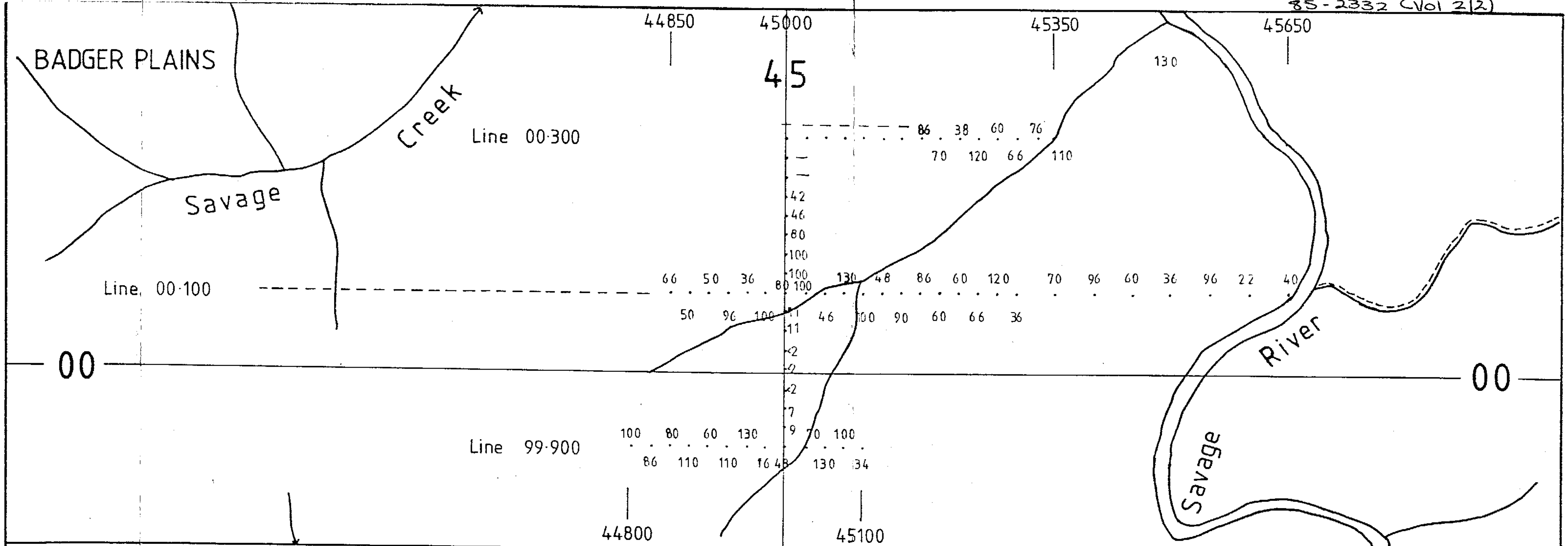
233184

200 100 0 500m

Scale 1 : 5,000

June 1984

3432



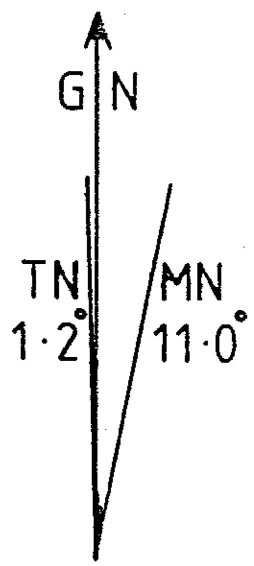
LEGEND

creek

foot track

soil sample (p.p.m.)

—00— grid lines AMG



INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.
E.L. 4/61 SAVAGE RIVER

WATERFALL CREEK GEOCHEMICAL SAMPLING ZINC ANALYSIS VALUES

DATA COLLECTED : L. Vanzino

COMPILED : L. Vanzino

DRAWN : H. Shannon

PLAN 4·4

5 cm

233185

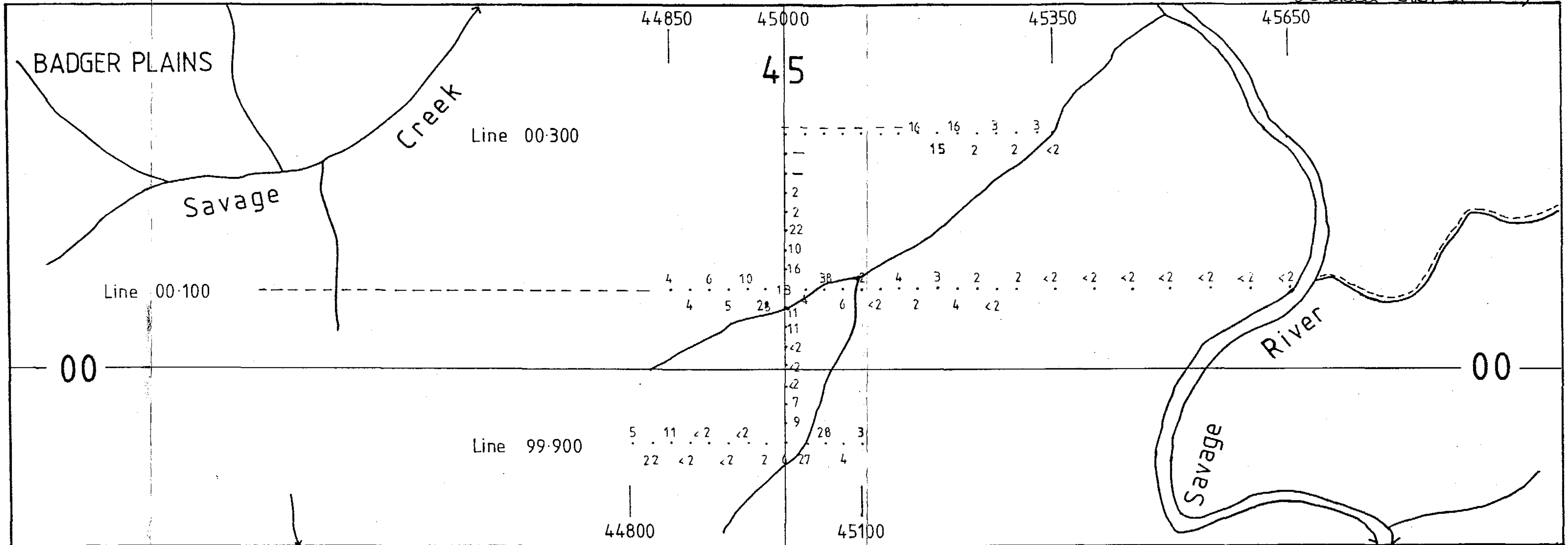
200 100 0 500m

Scale 1 : 5,000

June 1984

3433

85-2332 (Vol 2 of 2)



LEGEND

creek

foot track

soil sample (p.p.m.)

—00— grid lines AMG

G N | TN 1·2° | MN 11·0°

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.
E.L. 4/61 SAVAGE RIVER

WATERFALL CREEK GEOCHEMICAL SAMPLING ARSENIC ANALYSIS VALUES

PLAN 4·5

DATA COLLECTED : L. Vanzino

COMPILED : L. Vanzino

DRAWN : H. Shannon

5 cm

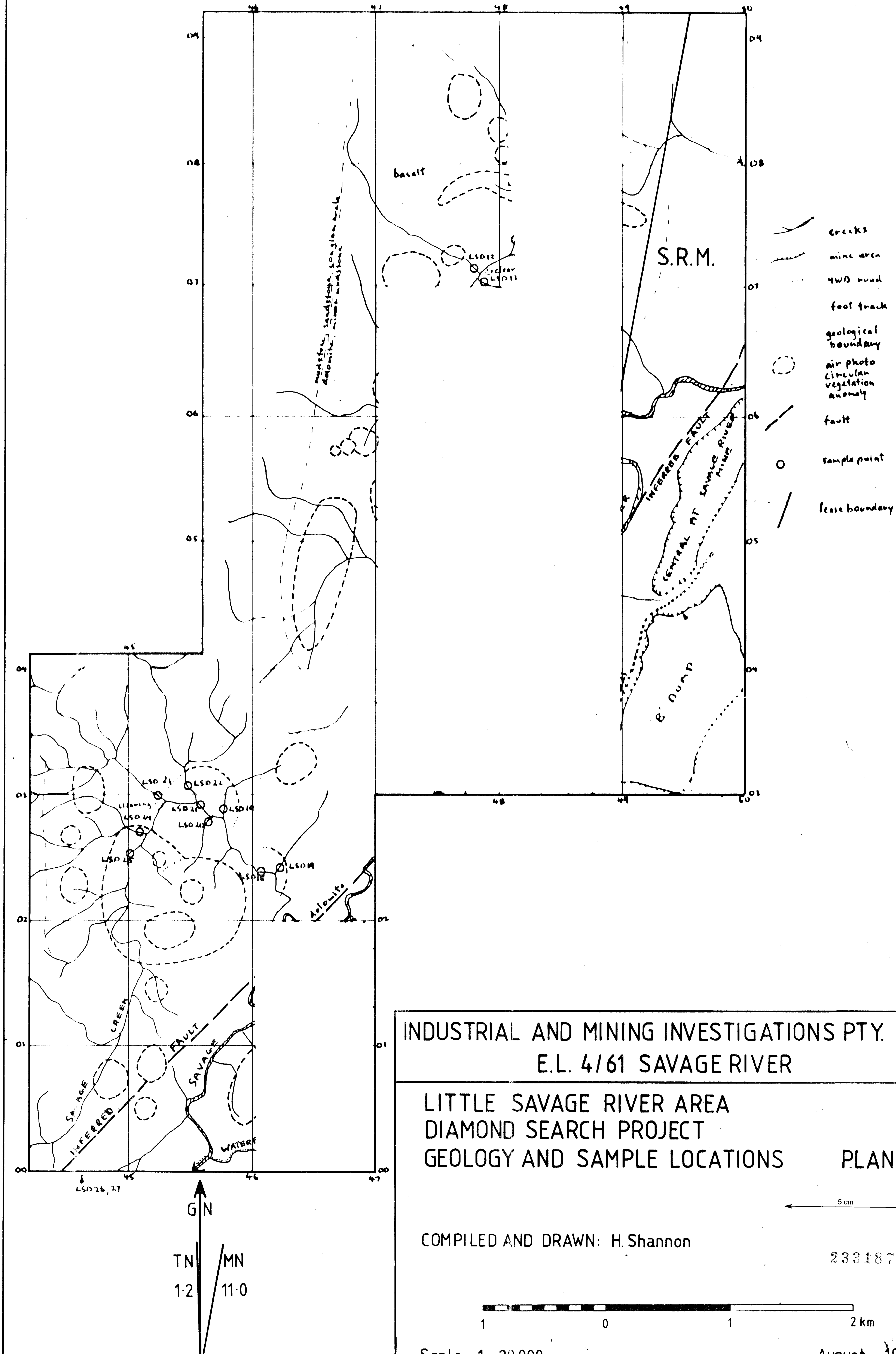
233186

200 100 0 500m

Scale 1 : 5,000

June 1984

3434



INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.
E.L. 4/61 SAVAGE RIVER

LITTLE SAVAGE RIVER AREA
DIAMOND SEARCH PROJECT
GEOLOGY AND SAMPLE LOCATIONS PLAN 6

COMPILED AND DRAWN: H. Shannon

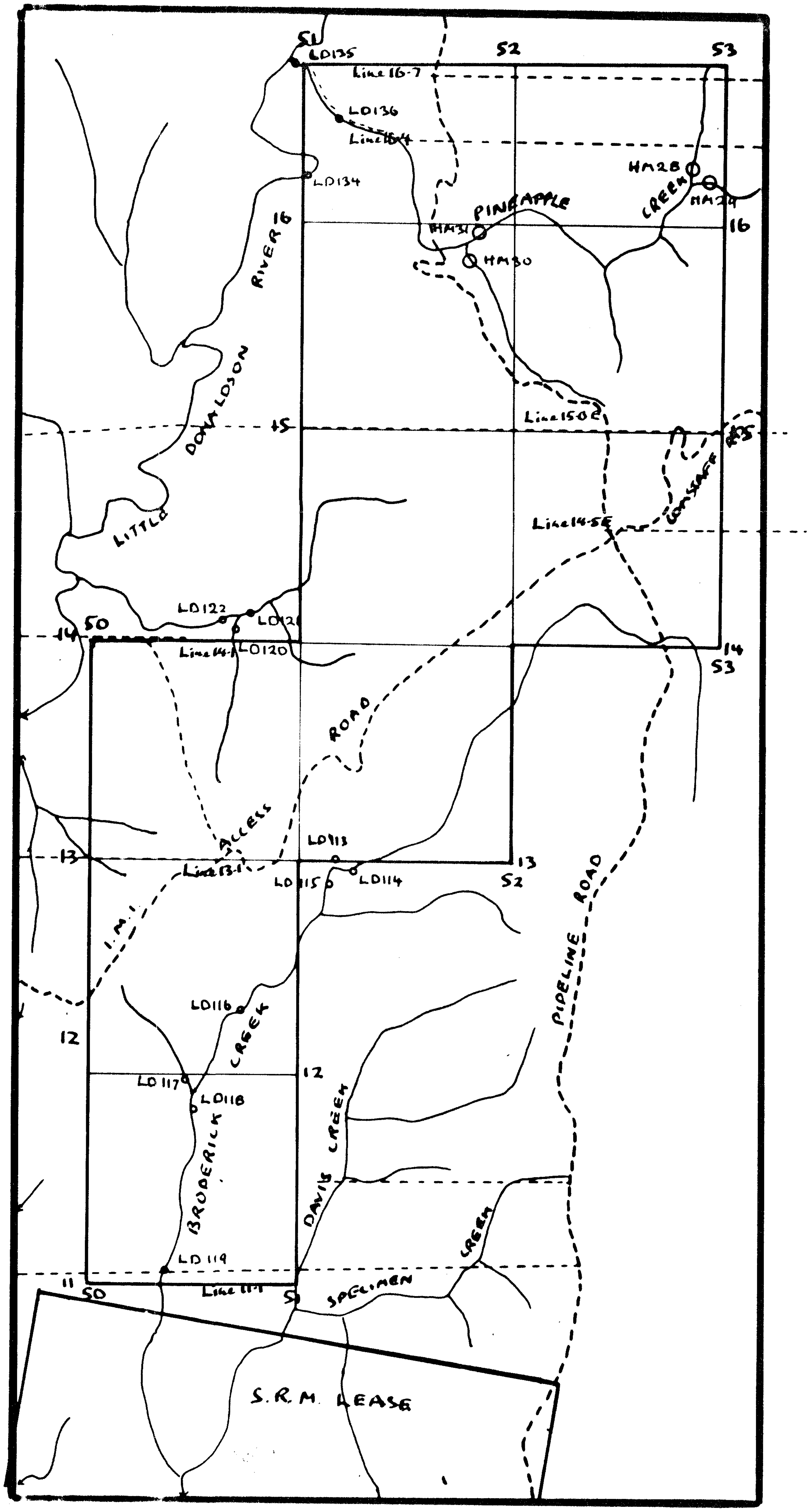
233187

Scale 1 : 20,000 August 1984

Revised Jan 1985 Plan ref I.M.I. - 4/61 - 1/85 - 18

3435

83-2332 (Vol 2/2).



MAP KEY

Formed road

Rough track

Cut line - walking track

Clearing suitable for helicopter

Large river

Other watercourse

Stream sediment sample point

Tenure boundary

Grid - Australian Map Grid

Geological boundary

Fault

30° Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BRODERICK CREEK BLOCK.

PLAN 1.1: SAMPLE LOCATIONS

DATA COLLECTED:
Silt bank samples: L.D.series 1981-82; H.S.; H.M.series,1983-84; B.P.
Soil samples: 1981-82; Lines 14.5, 15.0E,16.7: H.S.;Line 11.1,16.4, J.W. 1982-83; Lines 13.1,14.1,Road line: L.V.,M.E. Details Plan 2.1

COMPILED AND DRAWN: H.S.

SCALE 1:20,000 — 5 cm

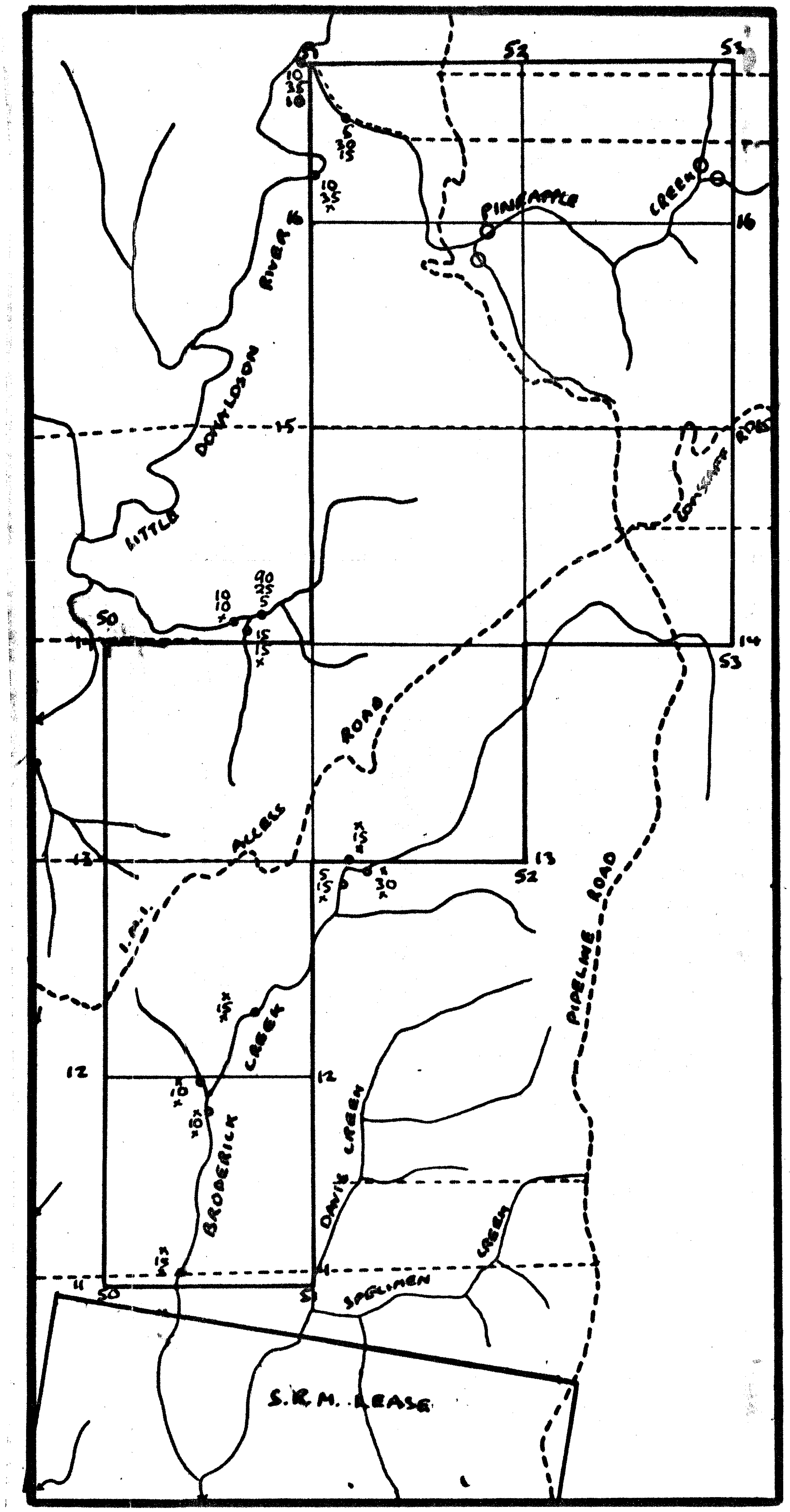
January 1985

Plan ref. IMI EL4/61 1/85-5

3436

233188

85-2332 (Vol 2/2)



MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Clearing suitable for helicopter
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BRODERICK CREEK BLOCK.

PLAN 1.2: Cu, Zn, Pb ASSAY VALUES IN L.D. SERIES SILT SAMPLES.

233189

COMPILED AND DRAWN: H.S.

SCALE 1:20,000

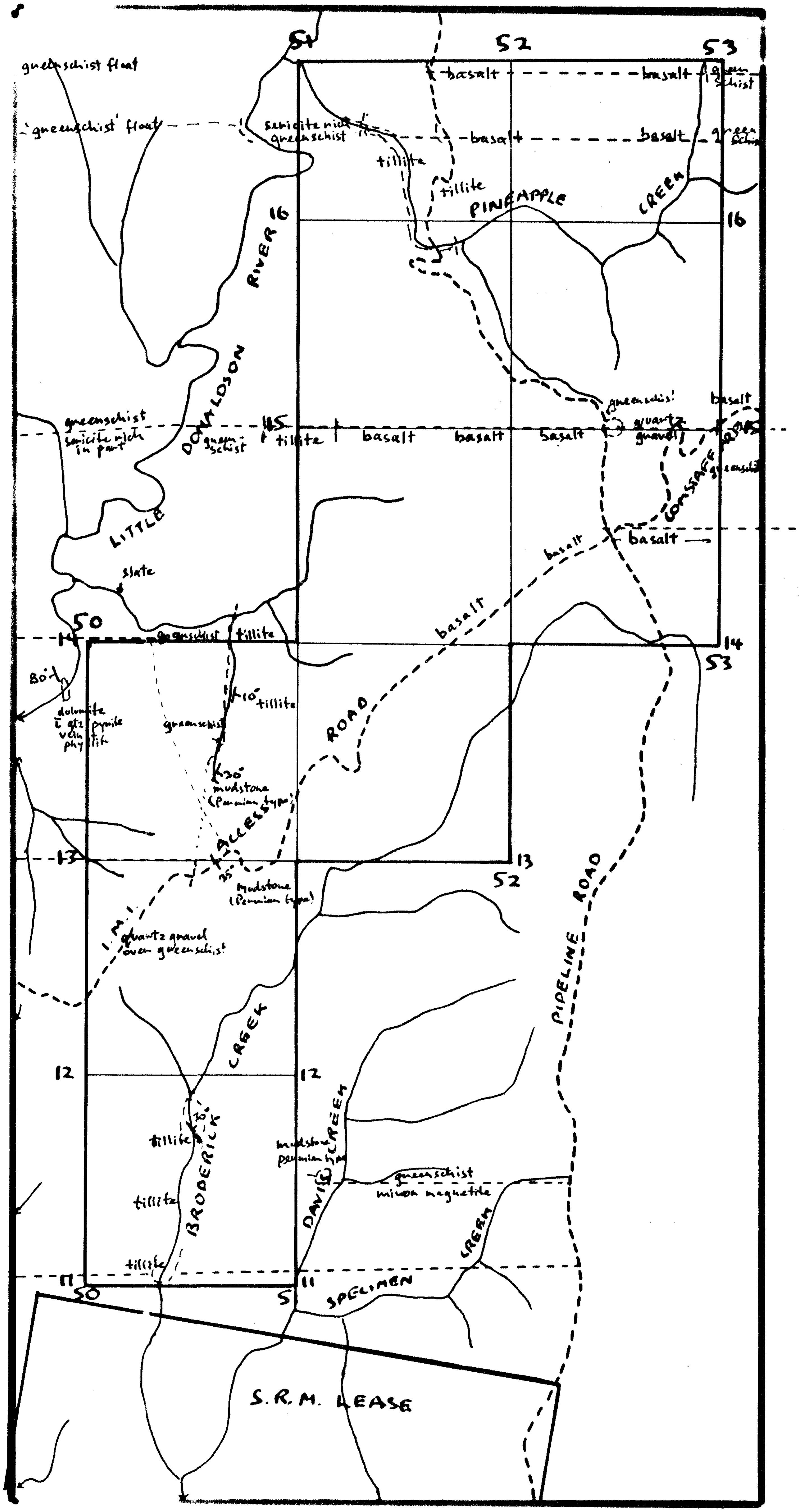
5 cm

January 1985

Plan ref. IMI EL4/61 1/85-6

3437

85-2332 (Vol 2/2).



MAP KEY

Formed road

Rough track

Cut line - walking track

Clearing suitable for helicopter

Large river

Other watercourse

Stream sediment sample point

Tenure boundary

Grid - Australian Map Grid

Geological boundary

Fault

Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BRODERICK CREEK BLOCK.

PLAN 1.3GEOLOGY - FIELD OBSERVATIONS

OUTCROP NOTES: H.S.

233190

COMPILED AND DRAWN: H.S.

SCALE 1:20,000

5 cm

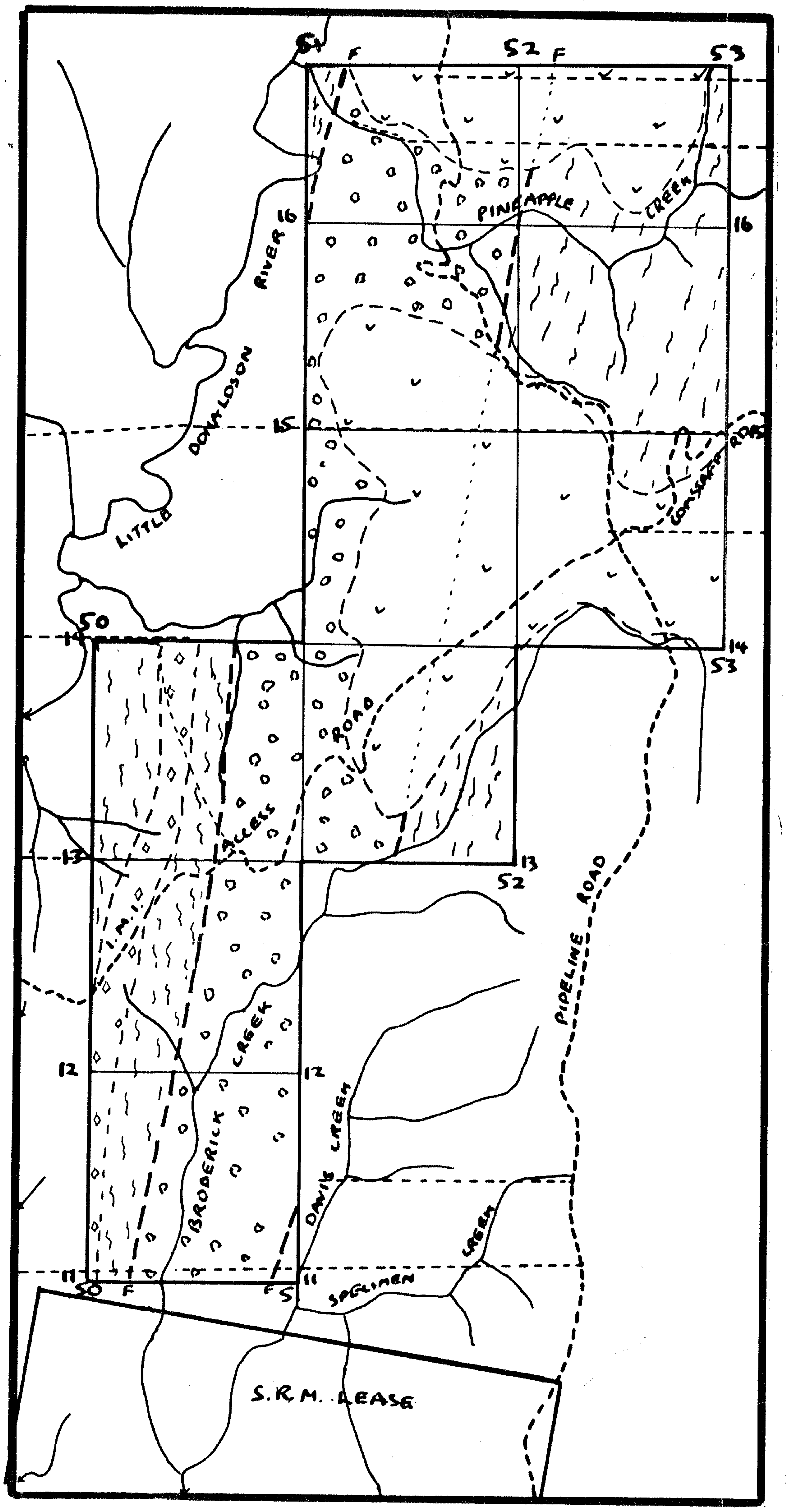
January 1985

Plan ref. IMI EL4/61 1/85-7

Largely after plan 1.1 of 82-1781
little new

8438

85-2332 (Vol 2/2)



MAP KEY

Formed road

Rough track

Cut line - walking track

Clearing suitable for helicopter

Large river

Other watercourse

Stream sediment sample point

Tenure boundary

Grid - Australian Map Grid

Geological boundary

Fault

Dip of strata

TERTIARY: Basalt

PERMIAN: Wynyard Tillite

PRECAMBRIAN: "Whyte Group"

"Battys Bend Formation"
Labile sandstone, phyllite, greenschist, turbidite sandstone, minor carbonates. Lithologies indicated:-

greenschist, etc.

quartz rich greenschist

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

BRODERICK CREEK BLOCK.

PLAN 1.4: GEOLOGY - INTERPRETATION

PHOTOINTERPRETATION BY H.SHANNON.

5 cm

COMPILED AND DRAWN: H.S.

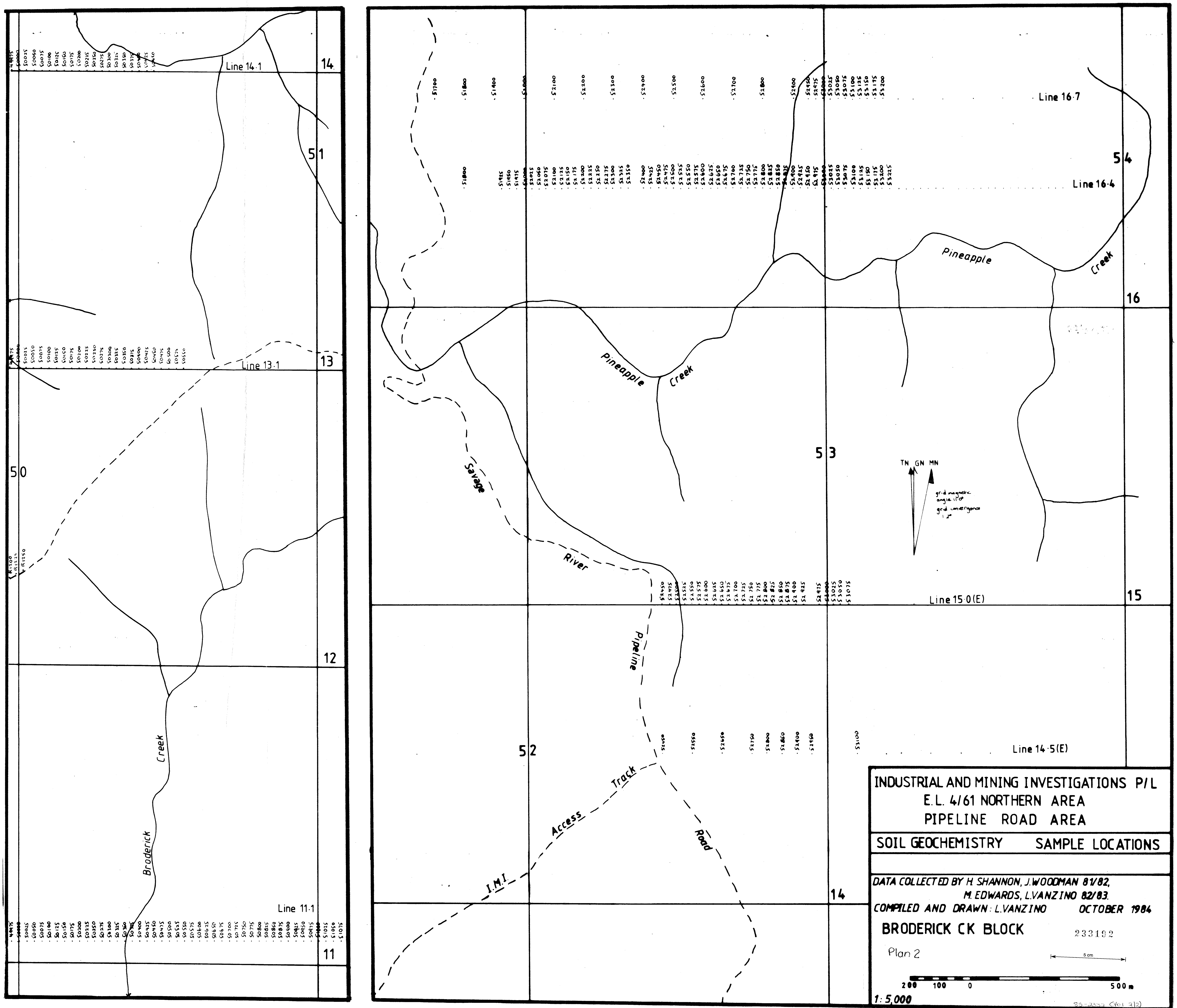
233191 3439

SCALE: 1:50,000

January 1985

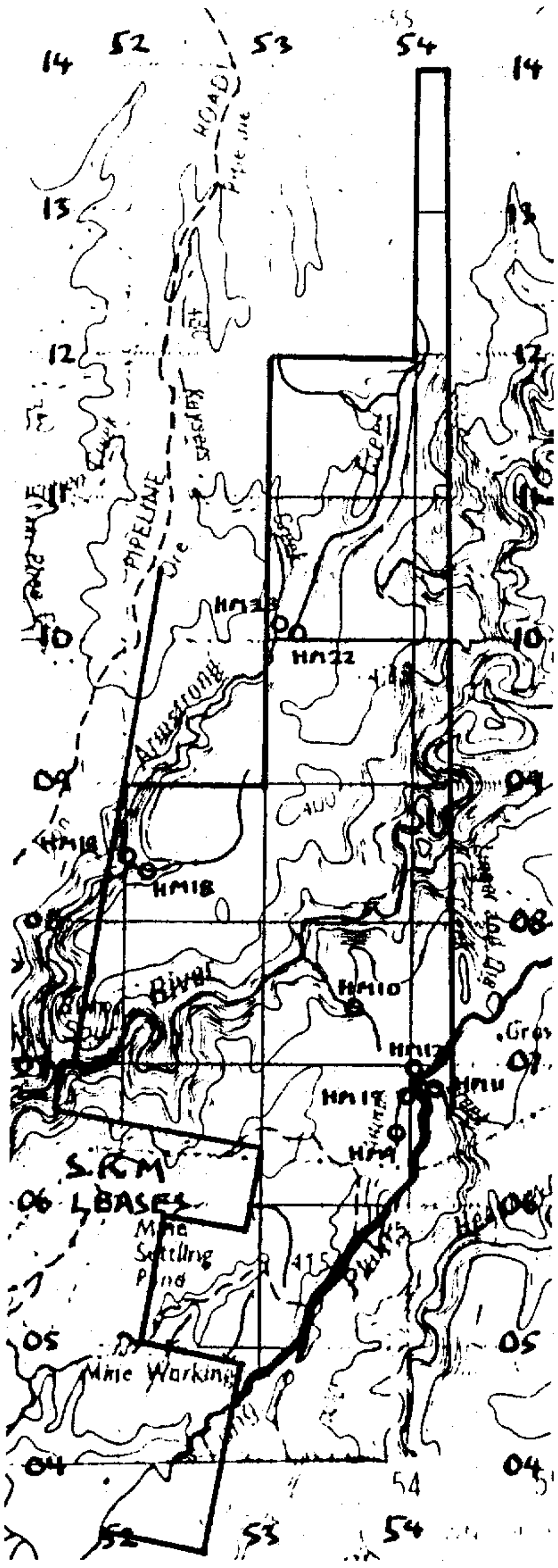
Plan ref. IMI EL4/61 1/85-8

85-2332 (Vol 2/2)



Line 14·1
14
51
13
Line 13·1
50
12
Broderick
Creek
Line 11·1
11
Line 16·7
Line 16·4
54
Pineapple
Creek
16
Savage
River
53
Line 15·0(E)
15
Pipeline
52
Line 14·5(E)
I.M.I. Access Track
Road
14
TN GN MN
INDUSTRIAL AND MINING INVESTIGATIONS P/L
E.L. 4/61 NORTHERN AREA
PIPELINE ROAD AREA
SOIL GEOCHEMISTRY SAMPLE LOCATIONS
DATA COLLECTED BY H. SHANNON, J. WOODMAN 81/82,
M. EDWARDS, L. VANZINO 82/83.
COMPILED AND DRAWN: L. VANZINO OCTOBER 1984
BRODERICK CK BLOCK
233192
Plan 2
200 100 0 500m
1: 5,000

f 3440



MAP KEY

Formed road

Rough track

Cut line - walking track

Large river

Other watercourse

o Stream sediment sample point

Tenure boundary

Grid - Australian Map Grid

Geological boundary

Fault

Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

ARMSTRONG CREEK BLOCK.

233193

5 cm

PLAN 1.1: SAMPLE LOCATIONS

DATA COLLECTED: 1983-84, B.P., L.V.

3441

COMPILED AND DRAWN: H.S.

SCALE 1:50,000

January 1985

Plan ref. IMI EL4/61 1/85-9

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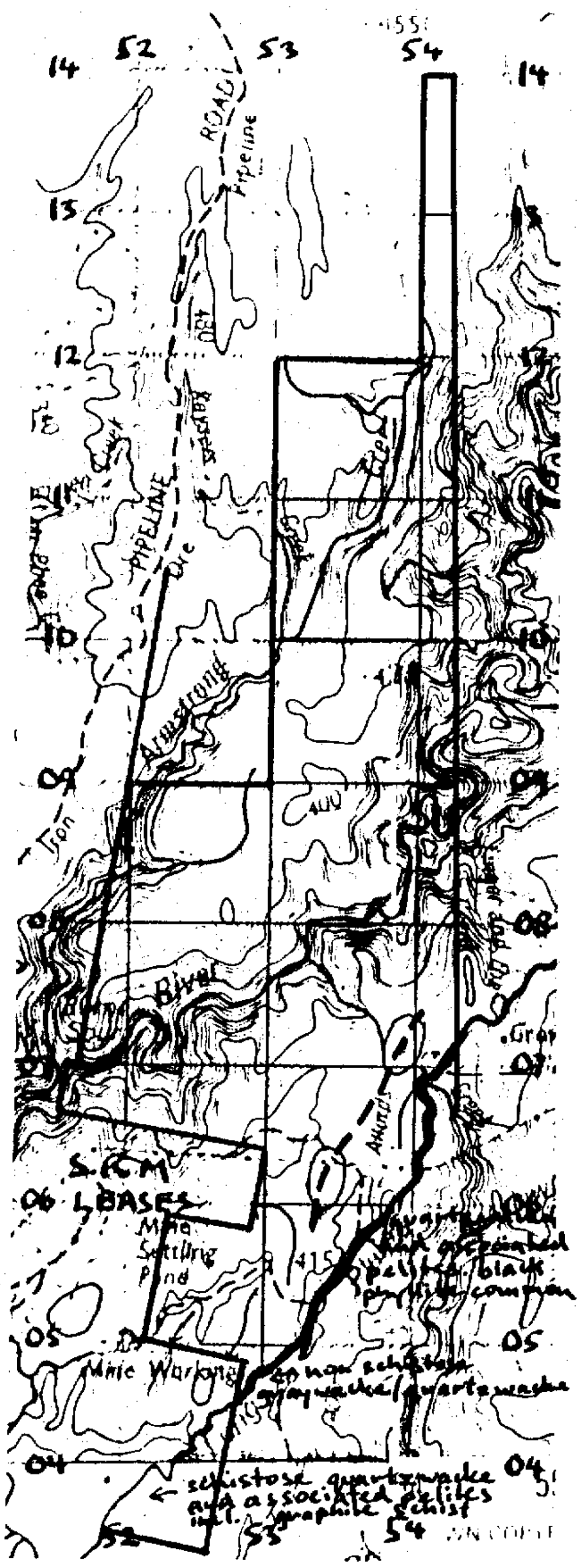


MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Large river
- Other watercourse
- O Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- 30° Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

ARMSTRONG CREEK BLOCK.

PLAN 1.2: GEOLOGY - FIELD OBSERVATIONS, MAGNETICS

DATA COLLECTED: 1983-84, B.P., L.V., H.S.

COMPILED AND DRAWN: H.S.

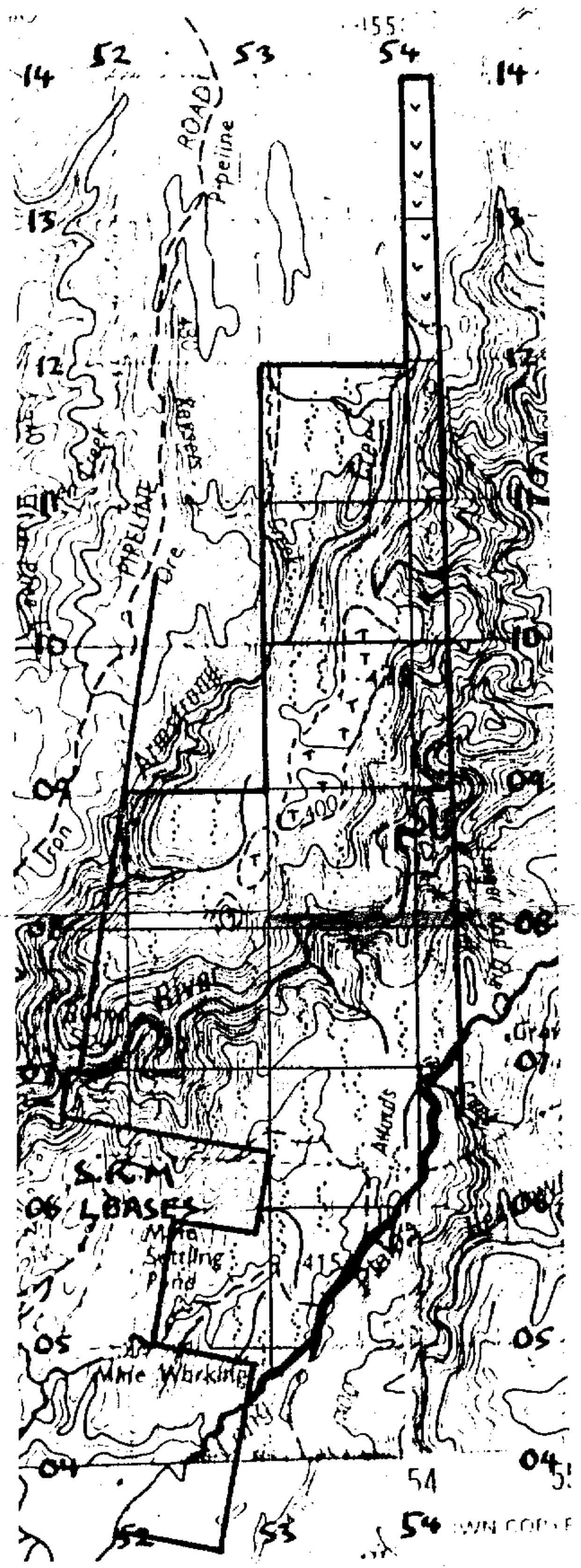
SCALE 1:50,000 — 5 cm

January 1985

Plan ref. IMI EL4/61 1/85-10

233194

3442



MAP KEY

Formed road

Rough track

Cut line - walking track

Large river

Other watercourse

Stream sediment sample point

Tenure boundary

Grid - Australian Map Grid

Geological boundary

Fault

30° Dip of strata

TERTIARY: Basalt

Gravel

PRECAMBRIAN: "Whyte Group"

"Oonah Formation"
Schistose quartzwacke and mica schist, graphite schist

"Battys Bend Formation"
Greenschist, turbidite sandstone, minor carbonates.

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

ARMSTRONG CREEK BLOCK.

PLAN 1.3: GEOLOGY - INTERPRETATION

PHOTOINTERPRETATION: H.S.

COMPILED AND DRAWN: H.S.

SCALE 1:50,000

5 cm

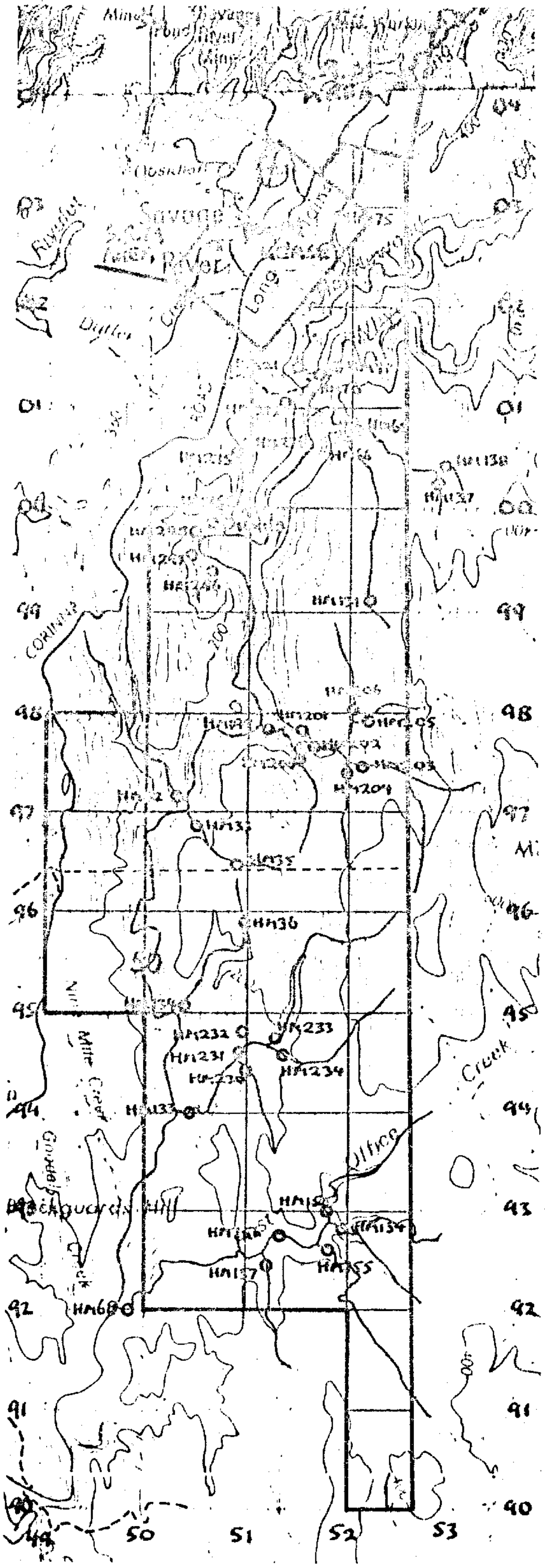
January 1985

Plan ref. IMI EL4/61 1/85-11

3443

233195

85 2332 (4/61 2/2)



MAP KEY

	Formed road
	Rough track
	Cut line - walking track
	Large river
	Other watercourse
o	Stream sediment sample point
	Tenure boundary
	Grid - Australian Map Grid
	Geological boundary
	Fault
30°	Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

WHYTE RIVER BLOCK.

PLAN 1.1: SAMPLE LOCATIONS

DATA COLLECTED: 1983-84, B.P., L.V., H.S., B.G., P.C.

COMPILED AND DRAWN: H.S.

SCALE 1:50,000

5 cm

January 1985

Plan ref. IMI EL4/61 1/85-12

233196

3444

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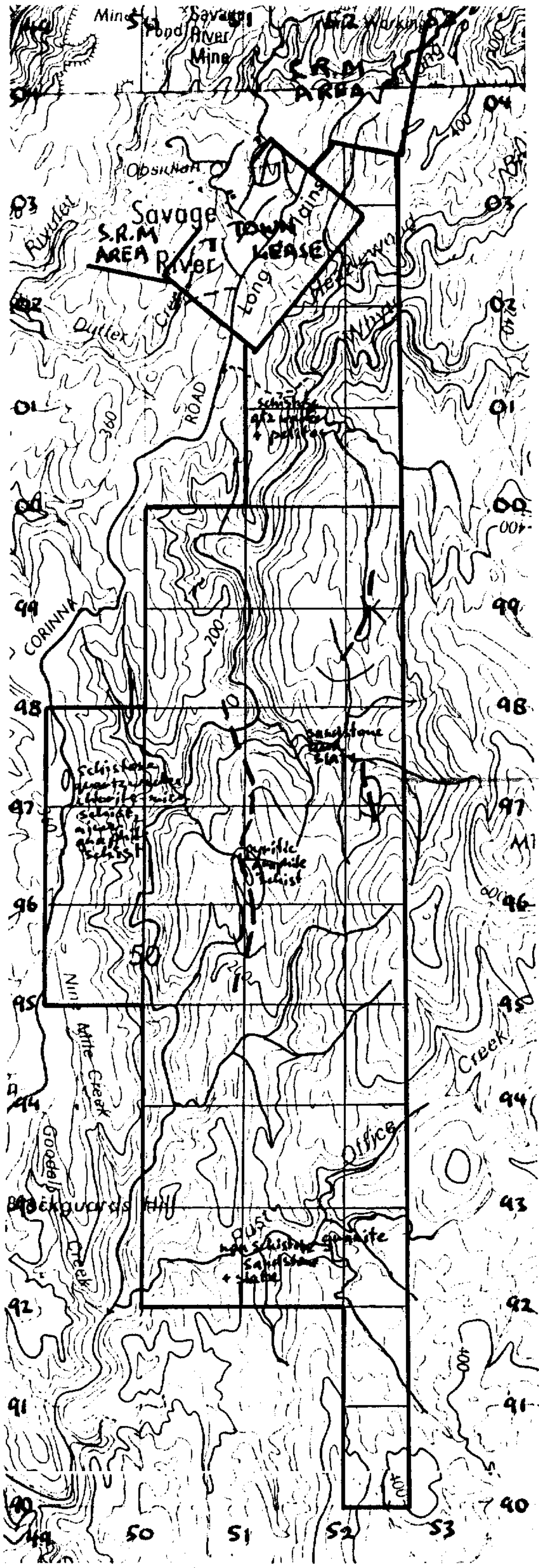


MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- Dip of strata
- Axis of magnetic high
- Magnetic contour

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

WHYTE RIVER BLOCK.

PLAN 1.2: GEOLOGY - FIELD OBSERVATIONS, MAGNETICS

DATA COLLECTED: 1983-84, B.P., L.V., H.S., B.G., P.C.

COMPILED AND DRAWN: H.S.

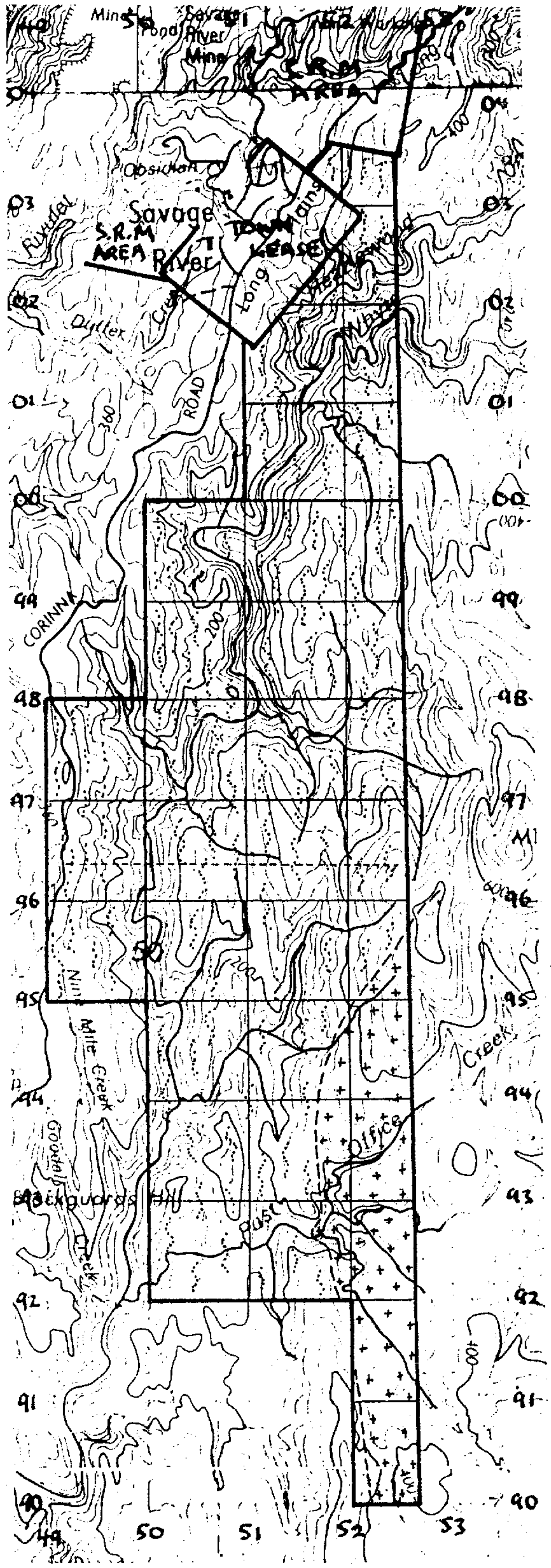
SCALE 1:50,000 — 5 cm

January 1985

Plan ref. IMI EL4/61 1/85-13

233197

85-2332 (Vol 2/2)



MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Large river
- Other watercourse
- o Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- ∠30° Dip of strata

DEVONIAN: Meredith Granite

PRECAMBRIAN: "Whyte Group"

"Oonah Formation"
Schistose quartzwacke and mica schist, graphite schist (West) greywacke and slate, (East)

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

WHYTE RIVER BLOCK.

PLAN 1.3: GEOLOGY - INTERPRETATION

PHOTOINTERPRETATION: H.S.

COMPILED AND DRAWN: H.S.

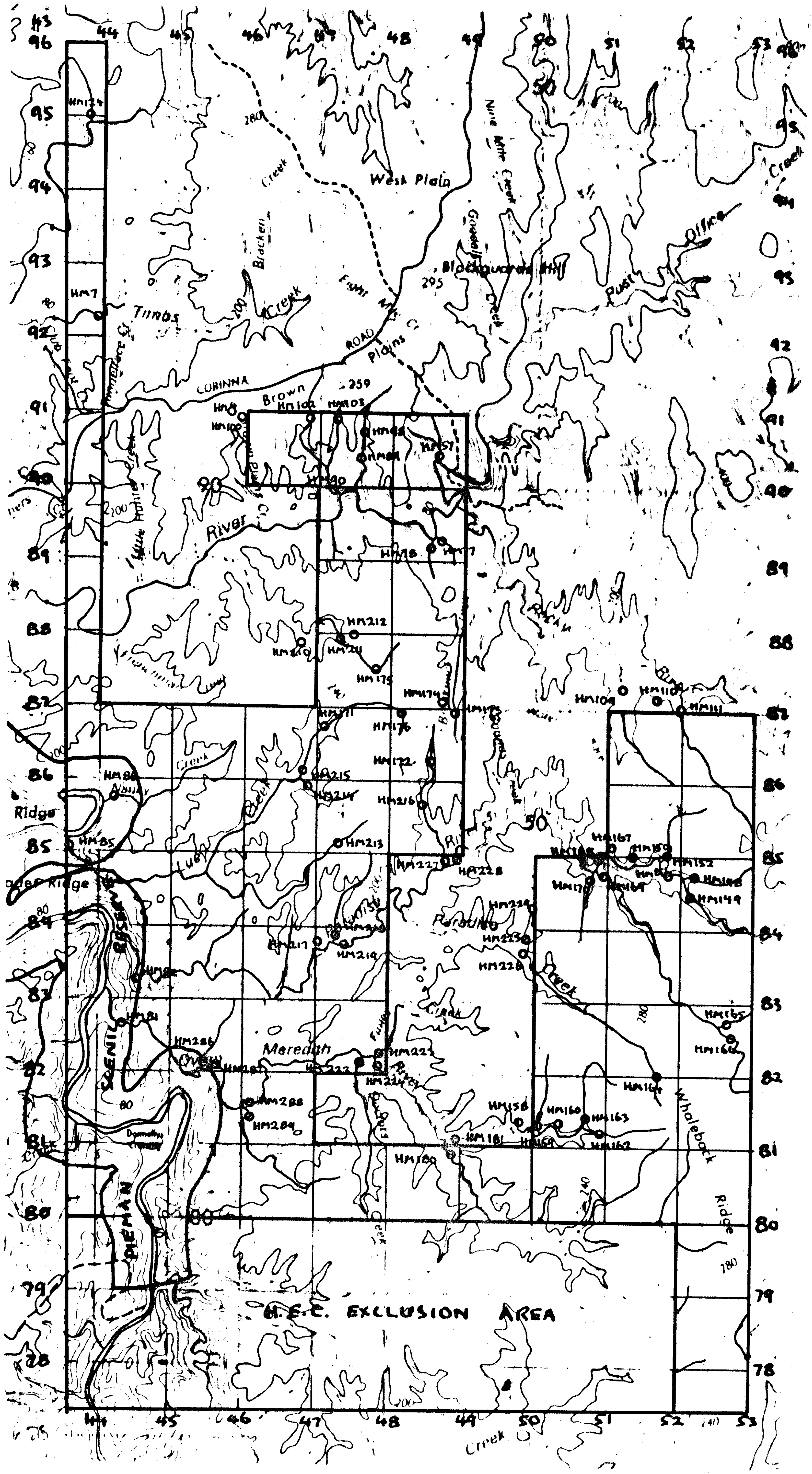
SCALE 1:50,000

5 cm

January 1985

Plan ref. IMI EL4/61 1/85-14

233198



MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Clearing suitable for helicopter
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- Dip of strata

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

LUCY CREEK BLOCK.

PLAN 1.1: SAMPLE LOCATIONS

DATA COLLECTED: B.P, L.V., H.S.,P.C., B.G.

COMPILED AND DRAWN: H.S.

SCALE 1:50,000 — 5 cm

January 1985

Plan ref. IMI EL4/61 1/85-15

233199

3447

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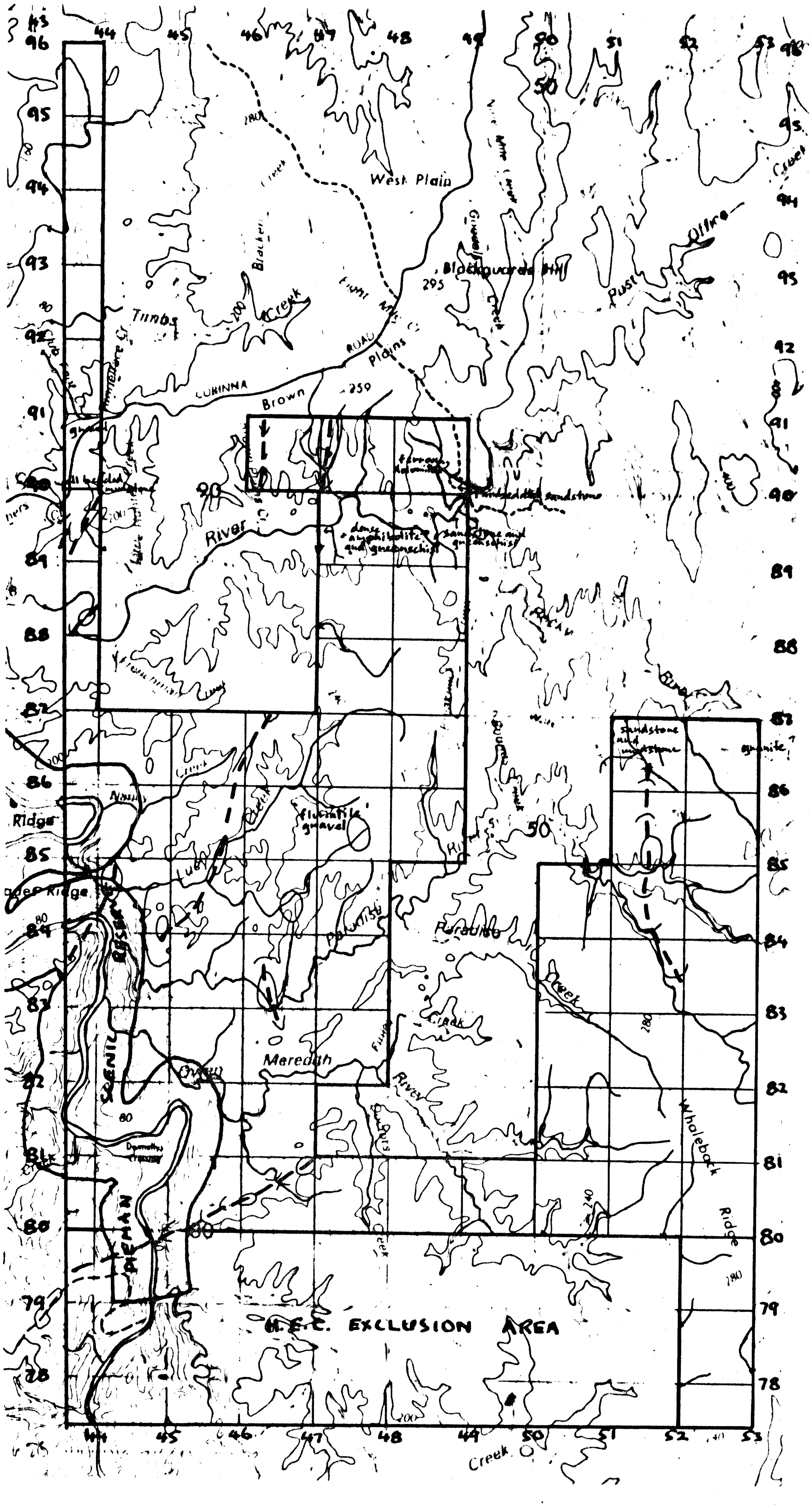


MAP KEY

- Formed road
- Rough track
- Cut line - walking track
- Large river
- Other watercourse
- Stream sediment sample point
- Tenure boundary
- Grid - Australian Map Grid
- Geological boundary
- Fault
- Dip of strata
- Axis of magnetic high
- Magnetic contour

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

LUCY CREEK BLOCK.

PLAN 1.2: GEOLOGY - FIELD OBSERVATIONS, MAGNETICS.

DATA COLLECTED: Outcrop notes: H.S.;
Magnetic data from Mines Dept. survey 1981
interpreted H.S. for axes.

COMPILED AND DRAWN: H.S.

SCALE 1:50,000

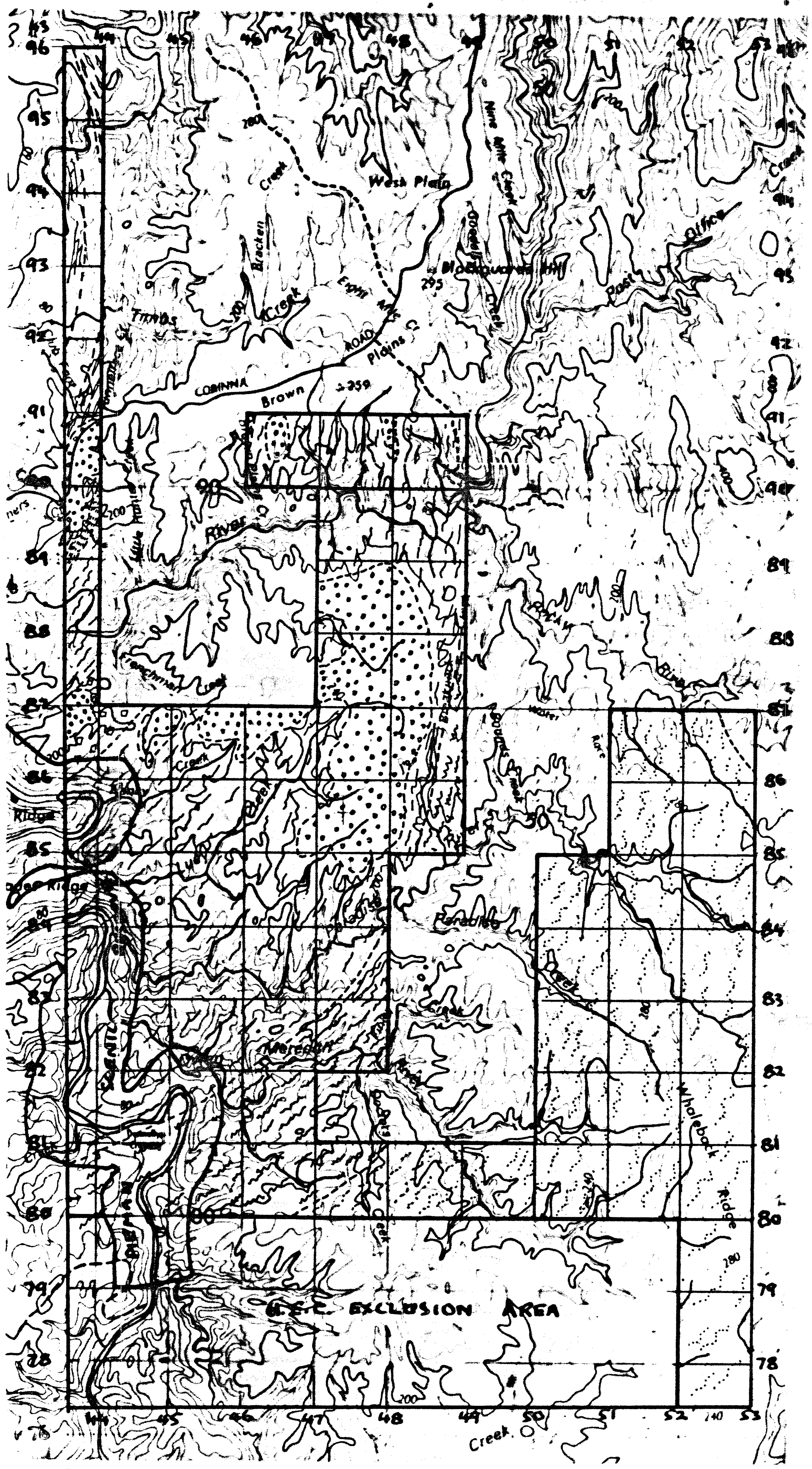
January 1985

Plan ref. IMI EL4/61 1/85-16

233200

3448

85-2332 (Vol 2/2).



MAP KEY

Formed road
Rough track
Cut line - walking track
Large river
Other watercourse
Stream sediment sample point
Tenure boundary
Grid - Australian Map Grid
Geological boundary
Fault
Dip of strata
Axis of magnetic high
Magnetic contour

TERTIARY:

"Brown Plain Formation"

Poorly rounded oligomictic pebble to cobble gravel and sand.

PRECAMBRIAN: "Whyte Group"

Oonah Formation

schistose quartzwacke and associated mica-chlorite pelites with some graphite schist; abundant quartz veins (west) greywacke and slate (east)

"Battys Bend Formation"
grey and green basal mudstone, labile sandstone, phyllite, greenschist, amphibolite, turbidite sandstone, minor carbonates, magnesite and magnetite near top. Lithologies indicated:-

greenschist, amphibolite, magnesite, magnetite

greenschist, turbidite sandstone etc.

quartz rich greenschist

mudstone

"Longback Formation"
slate; dolomite; fragmental and massive volcanics. Lithologies indicated:-

Volcanics

Slate

Dolomite

INDUSTRIAL AND MINING INVESTIGATIONS PTY. LTD.

E.L. 4/61 SAVAGE RIVER, WEST COAST TASMANIA.

LUCY CREEK BLOCK.

PLAN 1.3: GEOLOGY - INTERPRETATION

PHOTOINTERPRETATION BY H.SHANNON.

5 cm

COMPILED AND DRAWN: H.S.

SCALE: 1:50,000

January 1985

Plan ref. IMI EL4/61 1/85-17

233201
3449

85-2332 (Vol 2(2).