RGC EXPLORATION PTY. LIMITED
(on behalf of Renison Ltd)

EXPLORATION LICENCE NO.'S
102/87, 55/89 & 12/92

("Queenstown", "Mt Darwin" &
"Queenstown South")

West Sedgwick & Garfield/Clark Valley

FIRST COMBINED ANNUAL REPORT
April 1992 to March 1993

Volume 1 of 2

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CONTENTS

LIST OF PLANS & FIGURES

LIST OF APPENDICES

SUMMARY

Exploration Licences 102/87 Queenstown, 55/89 Mt Darwin and 12/92 South Queenstown cover a 40km N-S trending exposure of Cambrian Mt Read Volcanics from Lake Margaret to South Darwin Peak. E.L.'s 102/87 and 55/89 are held by BHP Minerals Ltd and explored by RGC Exploration under a joint venture agreement entered into on 29th November, 1991. RGC acquired an adjoining area as E.L. 12/92 on 12th October 1992. The total area covered by these licences is 249 sq km.

Work completed on these licences in the past 12 months covered two main areas, West Sedgwick and Garfield/Clark Valley. The stratigraphic top of an andesite sequence at West Sedgwick is considered to be a "favourable horizon" for the development of VHMS mineralisation. The andesite sequence is being tested by drill holes at a 400m spacing, designed to intersect the overlying sediment package at a vertical depth of about 300m. Two of the planned four holes WS006 and WS007 were drilled during 1992/93. The results of WS006 were disappointing but WS007 intersected a significant alteration zone with over 200m of strong silica-sericite-pyrite alteration in strongly cleaved andesitic to basaltic rocks.

In the Garfield-Clark Valley area, mapping and multi-element soil geochemistry has highlighted the potential of a group of andesitic rocks in the Garfield Valley. Further detailed mapping is planned in this area before selecting a drill site to test these rocks.

1. INTRODUCTION

Exploration Licences 102/87 - Queenstown and 55/89 Mt Darwin are held by BHP Minerals Ltd. (BHPM) and are explored by RGC Exploration Ltd under the terms and conditions of a joint venture agreement. An adjoining licence, E.L. 12/92 is held by RGC. Approval has been granted allowing the joint reporting of the exploration work because the tenements form a single coherent geological block.

The tenements currently occupy a total area of 249 sq kms surrounding Queenstown extending to the north, in part, some 30 kms to Moxon Saddle and to the south some 25 kms to South Darwin Peak (Figure 1). They cover a significant portion of the Cambrian Mount Read Volcanics. These rocks host a variety of significant mineral occurrences.

(i) Zinc - volcanic-hosted massive sulphide deposits, eg. Hellyer, Que River, Rosebery, Hercules and Tasman Crown
(ii) Copper - Mt Lyell style mineralisation
(iii) Gold - Henty style mineralisation.

Much of the previous work in this area targetted copper-gold mineralisation of the Mt Lyell style. More recently BHPM covered selected areas with blanket UTEM looking for VMS mineralisation. This was supported by some geological mapping and rock chip/stream sediment geochemistry.

RGC is also exploring this area for Rosebery-style VMS mineralisation. The exploration approach which has been applied involves detailed geological mapping in an attempt to identify possible mineralised horizons and alteration zones. This mapping is supported by multi-element soil and rock geochemistry. Any alteration zones thus identified can be tested by deep drilling and down-hole geophysics.

This report details the work completed by RGC during the period April 1992 to March 1993. This work has been undertaken in two areas, West Sedgwick and Garfield/Clark Valley. A prospective andesite sequence identified in the West Sedgwick area in the previous 12 month period has been re-mapped and tested by drilling. In the Garfield/Clark Valley, soil samples collected during a major helicopter-supported mapping programme were analysed for a broad suite of elements. These results formed the basis for developing litho-geochemical maps.

2. LAND TENURE

E.L. 102/87 - **Queenstown** was granted to BHPM on 22nd April, 1988. The tenement initially covered 95 sq kms in three separate parts (Figure 1)

Part (i)	-	Queenstown of 74 sq kms
Part (ii)	-	Garfield of 19 sq kms
Part (iii)	-	Moxon Saddle of 2 sq kms

Part (i) totally enclosed the Mt Lyell Mine Lease, 30M/80. In 1988 Mining Lease Application areas (MLA's) were cancelled by Mt Lyell increasing the area of Part (i) to 79 sq kms. Again in early 1992 additional MLA's were relinquished further increasing Part (i) to 84 sq kms. This tenement currently covers 105 sq kms and is due for 50% reduction on or before 22nd April, 1993. A meeting with representatives of the Department of Mines Tasmania (DMT) was held on 15th April, 1992 where RGCE expressed its interest in postponing the reduction date by 12 months due to its recent entry into the Agreement with BHPM.

E.L. 55/89 - **Mt Darwin** was granted to BHPM on 5th May, 1990. This tenement covers 78 sq kms and links Parts (i) and (ii) of E.L. 102/87 (Figure 1) resulting in a continuous exposure of Mt Read Volcanics over a strike length of 14 sq kms which is explored as a single coherent block. Because of this BHPM was successful in gaining approval from the DMT to jointly report on exploration activities (15th March, 1991).

E.L. 12/92 - **South Queenstown** was granted to RGC on 12th October 1992. This tenement forms a narrow strip partly enclosing the other E.L.'s. It is divided into 3 parts:

Part (i)	-	49 sq kms on the eastern side of the West Coast Range
Part (ii)	-	15 sq kms over Mt Sorell and Mt Strahan
Part (iii)	-	2 sq kms south of Lake Margaret.

A significant portion of E.L.'s 102/87 and 55/89 was within the South-West Conservation Area (SWCA) and considered to be "sensitive". Recently the SWCA has been revoked in areas north of Macquarie Harbour, however exploration activities in the Garfield/Clark Valley are still subject to approval from the Mineral Exploration Working Group.

The Agreement with BHPM, dated 29th November 1991, commits Renison to spend a minimum of $300,000 on exploration within the first year and then for subsequent years to meet the minimum statutory commitments imposed by the DMT. To complete the transfer of 70% interest in the tenements and be operators it is necessary for Renison to spend $1.5M within five years as sole contributor to exploration expenditure.

3. PREVIOUS WORK

Previous exploration in the Garfield/Clark Valley and West Sedgwick areas is detailed in *Cameron and Read (1991)* and *Halley (1992)*. Since the granting of the present licences, BHPM established a grid covering the Garfield, Thomas currie and upper Clark valleys. The entire grid was tested with UTEM, geologically mapped and rock chip sampled. The only significant conductor detected was along the Thomas Currie valley. This anomaly was tested by drilling and was found to be due to carbonaceous Gordon Limestone hidden by glacially transported scree.

Since entering the joint-venture, RGC extended the grid further south in the Clark Valley. The gridded area was remapped at 1:5,000 scale. A total of 261 rock chip samples were collected during the course of the mapping. Soil samples were collected at 50m spacings on lines 400m apart.

In the West Sedgwick area, BHPM established a grid from the north-west side of the Mount Lyell Mine Lease to Lake Margaret village. This grid was surveyed with UTEM. No significant conductors were detected in the West Sedgwick area.

RGC mapped the West Sedgwick grid and collected 139 rock chip samples. Work concentrated on an extension of the andesitic volcanics that host the Comstock mineralisation within the Mount Lyell Mine Lease. Mapping identified a patchy zone of alteration along the top of the andesites, beneath a band of sediments that locally form a base to the Tyndall Group Volcanics. A soil sampling programme was designed to test this stratigraphic position. The results of this programme were presented by *Halley (1992)*.

4. WORK COMPLETED

4.1 Garfield/Clark Valley

4.4.1 **Rock Chip Geochemistry**

During the 1991/92 mapping programme, 261 rock chip samples were collected. These samples were analysed for a broad range of elements by AAS, XRF and NAA. Although these results were presented in the last annual report (*Halley, 1992*) there had been insufficient time to evaluate the results. The samples collected were intended to provide a collection of "type" examples of the different lithologies as well as a set of altered or unusual rocks. An evaluation of the geochemical results was made using RGC's Geochemical Analysis System (GAS) software.

4.1.2 **Soil Geochemistry**

Similarly, during the 1991/92 season, 1,416 soil samples were collected, but no assay data were available at the time of the last report. The soil samples were submitted to Analabs in Cooee for analysis of a range of elements by AAS, XRF and NAA. These results have also been evaluated using the GAS software.

4.1.3 **Petrology**

Forty-eight rock chip samples and corresponding analyses were submitted to Tony Crawford for petrographic description. It was intended that the petrology plus geochemistry would enable a better interpretation of the rocks in the Garfield grid and also form the basis for comparison with other areas in the Mount Read Volcanics.

4.1.4 **Geological Interpretation**

Geological fact maps based on the grid mapping and selected ridge and creek traverses were presented in *Halley (1992)*. Geological interpretation maps were compiled from the factual geology, the litho-geochemical maps generated from the GAS program and from the petrology report compiled by Tony Crawford.

4.1.5 **Rehabilitation**

BHP were advised by RGC on 20 August 1992 that the Garfield track and Camp 4 in the Clark Valley were no longer required. BHP subsequently contracted Tim Duckett of Land Rehabilitation Services (LRS) to supervise the rehabilitation work. LRS organised an inspection of the track with the Mineral Exploration Working Group (MEWG) on 16 February 1993, before the rehabilitation work commenced. Camp 4 was badly damaged by a storm, probably during the winter of 1991. Personnel from RGC dismantled the sheds and packed up the remaining equipment and rubbish from the site of Camp 4. All of this material was removed by helicopter on 17 November 1992.

4.2 West Sedgwick

4.2.1 **Rock Chip Geochemistry**

During mapping of the West Sedgwick and Comstock grids, 139 rock chip samples were presented in last years annual report. These results have also been evaluated using the GAS software.

4.2.2 **Soil Geochemistry**

During the 1991/92 field season, a soil sampling programme was completed in the Agglomerate Hill area. The results and interpretation of this survey were presented in the last annual report. This data has also been re-assessed and re-interpreted using the GAS programme. This re-interpretation contributed to the geological interpretation.

4.2.3 **Mapping**

Prior to drilling in the West Sedgwick area, remapping at 1:1,000 scale of a sheet centred over Agglomerate Hill was completed. This was done to ensure optimum selection of a drill site to test the andesite sequence at Agglomerate Hill. Following this, a geological interpretation map was compiled from the 1:1,000 and 1:5,000 scale geological fact maps and the interpreted results of the rock chip and soil geochemistry.

4.2.4 **Drilling**

Drill hole WS005 was planned as an extension of WS4, drilled by Goldfields Exploration in 1987. The reason for drilling this hole was because WS4 intersected an unusual hematitic limestone unit near the end of the hole. This is considered to be a correlate of a limestone found in the vicinity of Comstock. On the basis of its isotope geochemistry, the assymetry of the alteration below versus above the limestone, and in one instance, an association of the limestone with a small massive sulphide lens at Comstock, this limestone is interpreted as a low temperature exhalite. It was considered therefore that

WS005 should be drilled beyond the end of WS4 to fully test the andesite sequence that contains the limestone and also to test the volcanic sequence in the vicinity of the intersection of the West Sedgwick and Great Lyell Faults, a structural position analogous to that of Cape Horn. The PVC casing in WS4 could not be removed so it was considered to be easier to restart the hole from surface rather than go back down WS4.

Longyear were contracted to drill WS005. An LY44 rig was flown by helicopter to the site on 2 April 1992. Drilling of WS005 commenced on 4 April 1992. The hole was drilled to a depth of 97.9m in HQ before the rod string was broken at 50m when trying to pull it out. Attempts to retrieve the rods remaining in the hole were unsuccessful due to material falling in from further up the hole. WS005A was lipped off the broken rod with a 1.5m NQ barrel, NQ core starting at 52.0m. This hole continued to 124.0m where a major fault was encountered. To progress beyond this fault it was necessary to ream the hole out in HQ, case off in HQ, and continue in NQ. This proved time consuming and expensive, with bits being destroyed trying to ream past the rods left in WS005. WS005A was abandoned and the rig was shifted a metre forward.

A helicopter had to fly in additional consumables to the drill site on 24 April 1992. WS006 was commenced on 26 April 1992. The hole was cased off in HQ at 197.2m and continued in NQ to 380.8m. Down-hole surveys were taken every 30m with an Eastman Single shot camera and core orientation surveys were done with a Van Ruth orientator, but only in competent ground. The hole was completed on 1 June 1992. All rods and casing were successfully retrieved from the hole. The hole was cased with PVC. The drill rig and core were not flown out from the site until 16 November 1992 due to a combination of bad weather and unavailability of Longyear personnel.

When the core was eventually flown out, it was transported to RGC's Queenstown core shed where it was logged and RQD's and recoveries were calculated. A portion of the core was split and submitted for assay. The position of the collar was determined by West Coast Surveys, who also re-checked the co-ordinates of the WS004 collar.

A programme of six drill holes was planned between the Comstock chert and WS006. The purpose of these holes was to test the top of the andesite sequence, particularly the position of the inferred exhalite horizon, at a depth of around 300m below surface, below the range of detection of surface EM methods. The holes were planned at a 400m spacing so that the entire andesite sequence between holes could be tested by down-hole EM. The first three holes in this programme tested targets within the Mount Lyell Mine Lease. Two of these holes were collared just within E.L. 102/87 but drilled south into the M.L. and so will not be reported here. Of the remaining three holes two were planned within E.L. 102/87 and one was to be collared within the M.L., drilling towards E.L. 102/87. At the time of writing this report one of these three proposed holes WS007 had just been completed.

Diamond Drilling Tasmania were contracted to drill WS007 from the saddle between Agglomerate Hill and Zig Zag Hill. An LY44 rig was flown in by helicopter on 4 February 1993. The drillers walked in and out daily along grid line 6200N from the Lake Margaret Road. The hole was cased off in HQ at 103m and continued in NQ to 499.2m. The hole was ended on 8 March 1993. At the time of writing, the rig and core had not been removed from the site so no further details of the hole can be reported at this stage. However preliminary observations of the core indicate that the hole intersected a sequence of basaltic pillow lavas and massive andesites with strong to intense silica-sericite-pyrite alteration, passing into a more weakly altered package of andesitic volcaniclastics and sediments.

5. RESULTS AND DISCUSSION

5.1 Garfield/Clark Valley

The Geochemical Analysis System (GAS) is a PC operated program for analysing and evaluating multielement geochemistry. The programme uses statistical methods, particularly principle component analysis and discriminant analysis to recognise domains or chemically similar populations within a geochemical dataset. Once a particular group has been identified it can be colour coded to distinguish it from the other chemical groups. In this way, litho-geochemical maps can be built up from a multi-element database. GAS has a range of other options, for example, each sample can be represented on a map as a symbol of the determined colour code, with the symbol size proportional to the assay value for a particular metal. In this way, for example, a map of the distribution of lead could be produced with colours representing litho-geochemical units.

The following suite of elements were measured for both the rock chip and soil samples from both the Garfield/Clark Valley grid and the West Sedgwick area.

LAB	METHOD	ELEMENTS
ANALABS	AAS	Cu, Pb, Zn, Ag, Ni, Mg
ANALABS	XRF	P, Ti, V, Zr
BECQUEREL	NAA	Sb, As, Ba, Br, Ce, Cs, Cr, Co, Eu, Au, Hf, Ir, Fe, La, Lu, Mo, K, Rb, Sm, Sc, Se, Ag, Na, Ta, Th, Sn, W, U, Yb, Zn

5.1.1 Rock Chip Geochemistry

The rock chip samples from the Garfield/Clark Valley grid were split into 5 litho-geochemical groups. These groups correspond to Yolande River Sequence volcanics, Central Volcanic Complex volcanics, a range of epiclastics, andesites and black shales. Some of the element associations that define these groupings, and a colour coded litho-geochemical map are shown in plans 5 and 6. Distributions of Cu, Pb, Zn, Ag, Au, Ba, As and Sb relative to the colour groupings are shown in plans 7 and 8. Apart from one value of 0.95% Cu in a shaly epiclastic, the andesites in the Garfield Valley generally have a higher background in most metals than the other rock types. Although the most obvious alteration zones mapped on the grid occur in and around the andesites, the unaltered andesites also have relatively high metal backgrounds. One isolated sample of 3.1 ppm Au should also be noted.

5.1.2 Soil Geochemistry

The soil samples from the Garfield/Clark Valley grid were sub-divided into 7 geochemical groups. These included the 5 groups recognised in the rock chip samples plus one group corresponding to the Own conglomerate plus another distinctive group which corresponds to the Pioneer Beds. The groups are:

(i) Yolande River Sequence volcanics
(ii) Central Volcanic Complex volcanics
(iii) epiclastics within both the YRS and CVC
(iv) black shales within both the YRS and CVC
(v) andesites
(vi) a small wedge of Owen conglomerate at the southern end of the grid
(vii) Pioneer beds.

Some of the element associations contributing to the classification of the groups are shown in plan 9. The distinction between the two Owen sandstone units is interesting, one characterised by detrital zircon and the other by detrital chromite. The litho-geochemical map derived from the soil samples is shown in plan 10. Distributions of Cu, Pb, Zn, Ag, Au, Ba, As and Sb are shown in plans 11 and 12. In terms of these elements, two units stand out. Not surprisingly the black shales have relatively high Cu, Pb, Zn, As and Sb. More significantly, the andesites in the Garfield Valley have elevated Cu, Pb, Zn and Au. One samples reached 0.48% Cu and several samples were around 0.1 ppm Au.

5.1.3 Petrology

Tony Crawford's petrology report is presented as Appendix 3 (sample locations are given in plans 2, 3 and 4). A number of conclusions are made from this work.

(i) The CVC rocks are dominated by rhyolitic to dacitic lavas and shallow intrusives.
(ii) Many of the rocks mapped as YRS lavas are actually volcaniclastics as is evident from the abundance of broken crystals and tube pumice fragments.
(iii) Some of the YRS sediments contain Precambrian metamorphic detritus, a characteristic of the overlying Tyndall Group epiclastics on the flanks of Mount Sorell.
(iv) The andesites in the Garfield Valley petrographically and geochemically closely resemble the Crown Hill and Anthony Road andesites. These are quite

unusual rocks, and there seems little doubt that they are correlates.

5.1.4 Geological Interpretation

The description of the geological units from the 1991-92 report (*Halley, 1992*) is included below:

Central Volcanic Complex (Ccf)

The oldest rocks occurring in the gridded area are those belonging to the Central Volcanic Complex. These rocks occur along the eastern side of the grid and extend up onto the crest of the West Coast Range. In the northern part of the grid the Ccf can be divided into 3 units on the basis of textural variations. Ccf3 is feldspar phyric, typically with around 5% feldspar phenocrysts up to 2 to 3 mm long. It has a distinctive granular groundmass which is best seen on weathered surfaces. Ccf2 is also feldspar phenocrysts up to 5mm. It has a very fine-grained groundmass. Ccf1 was observed only along Thomas Currie Rivulet on the south-western side of Snake Spur. It has a fine granular groundmass like Ccf3 but has very sparse phenocrysts. These units are most likely, massive rhyolitic to dacitic lavas.

In many instances the Ccf rocks have developed a penetrative cleavage and have been metamorphosed to greenschist grade. This had the effect of destroying much of the primary texture. Such rock have been mapped as undifferentiated Ccf. The Central Volcanics also includes narrow bands of well-bedded black siltstone.

Yolande Sequence (Cy)

Rock belonging to the Yolande Sequence occur along the centre of the Clark and Garfield Valleys and over the northern end of the Currie-Garfield divide. The distinctive feature of the Cy group compared to the Ccf is the present of conspicuous quartz phenocrysts. The most common rock type within the Cy group has 5 to 20% quartz phenocrysts, usually around 3mm, but as coarse as 5mm, set in a very fine-grained groundmass (Cytq). In outcrop these rocks are white in colour, and typically are strongly foliated. They commonly also contain feldspar phenocrysts (Cytqf) but this is obvious only in less foliated outcrops. Towards the top of the sequence, the rocks contain coarse mica phenocrysts (Cytqm). The mica appears to be muscovite but probably was originally biotite. Other than the porphyritic nature, the Cyt rocks rarely have any distinctive textures preserved, although some flow banded outcrops have been observed.

At the northern and southern ends of the grid it is relatively straight forward to determine the position of the Cyt-Ccf contact. However, in the central part of the grid for about 1.5km either side of Slate Spur, the contact is not a simple one, containing several alterations between Cyt and Ccf. Creek traverses through this zone indicate that the Ccf is cut by dykes of Cytq. Three well exposed intrusive contacts occur at 321985N 381310E, 321170N 381255E and 319200N 382155E. Although some small intrusives have been mapped, most of the Cytq rocks are probably lavas, along with derived sediments.

Some sediment dominated (Cys) packages have been mapped within the Cy group. These can occur anywhere through the group but are most common towards the top of the sequence. The best exposed group of sediments occurs along the Garfield River between 2000N and 4400N. The sediments include greywacke, lithic arenite, siltstone and laminated mudstone. Graded bedding indicates that this is a west facing sequence.

Another unit which has been mapped within the Cy group is a coarse crystal-rich epiclastic unit (Cye). It is a green rock, rich in coarse feldspar phenocrysts, with minor quartz phenocrysts and lithic fragments. It appears to grade up into finer-grained crystal rich rocks and bedded siltstones. This is interpreted to be a mass-flow unit.

Andesites

Small andesite bodies have been mapped within both the Cy and Ccf groups. The best example of the andesite is on line 1800N. This outcrop contains relatively fresh, undeformed, hornblende-feldspar phyric andesite similar in appearance to the Crown Hill andesite. However most of the andesite occurrences are relatively weathered, cleaved and altered to sericite-chlorite, although relict textures may still be evident. A long narrow body of andesite has been interpreted between lines 2000N and 3400N. Occurrences of sediment overlying the andesite suggest that this may be an extrusive rock. Another andesite body has been interpreted near the Thomas Currie Rivulet, within the Ccf, although all exposures of this rock are deeply weathered.

Tyndall Group

Coarse volcaniclastic conglomerate, correlated with the Tyndall Group, overlies the Yolande Sequence along the western side of the grid. The clasts are very well rounded and were formed from a variety of quartz-phyric volcanics. There is also a significant proportion of clasts formed from Precambrian quartzite. Rare clasts contain veins of magnetite similar to those occurring in the Ccf adjacent to the Darwin Granite. The Ctc unit also contains beds of volcaniclastic sandstone and dark grey siltstone.

The best exposed contact between the Ctc and Cy sequences is in the Garfield River between lines 4200N and 4400N. The coarse conglomeratic base of the Ctc appears to cross-cut beds in the underlying Cys siltstone, but this appears to be a scour feature as siltstone beds within the Ctc have the same orientation as beds within the Cys. Exposures in smaller creeks to the south all suggest that the Cys and Ctc are conformable.

Owen Conglomerate

The Owen Conglomerate forms topographic highs because of its hard siliceous nature. In the area of the grid it forms the ridge between the Garfield River and Flannigans Creek and it forms Snake Spur. Along these two ridges, the Owen occurs as a clean quartz sandstone with some horizons containing small quartzite pebbles. These rocks are correlates to the Pioneer Beds. The ridges of Owen are limbs of synclines, plunging gently to the northwest. In both of these synclines, the thickness of the Owen decreases significantly from south-east to north-west, particularly in the area around Flannigans Flats. No well-exposed contacts between the Owen Conglomerate and the underlying sequences were observed. However, along the Garfield River between lines 4200N and

4400N, the Ctc dips west at around 80° while the Ooc dips west at about 60°. Similarly on Mount Sorell, the Owen Conglomerate dips less steeply than the underlying Ctc, suggesting an angular unconformity even though both sediments occupy the same depositional basis.

Gordon Limestone

The north-west plunging synclines in the Garfield and Thomas Currie valleys contain cores of Gordon Limestone. Acid groundwater leaching of the limestone leaves a residue of black carbonaceous pug, some of which occurs at the northern end of Flannigans Creek. This is the only "outcrop" of the limestone. Elsewhere it is covered by Quaternary alluvium and screen deposits.

Discussion

The Yolande Sequence is considered by Keith Corbett to be older than the Central Volcanic Complex, however, field relationships observed in the Garfield/Clark Valley area suggest the opposite. The best evidence comes from the Cytq dykes intruding the Ccf. The other evidence is the stratigraphic relationship of these two units with the overlying Tyndall Group. A significant unconformity between the Tyndall Group and the Central Volcanics is exposed on the South Darwin Plateau. At this location the Ccf was intruded by the Darwin Granite which was subsequently unroofed and eroded prior to deposition of the Tyndall Group. Large clasts of Darwin Granite occur in the basal section of the Ctc. However, the Ctc appears to conformably overlie the Yolande Sequence. The most probable interpretation of these relationships is that the Yolande Sequence unconformably overlies the Central Volcanics.

The Yolande Sequence occurring in the Garfield/Clark Valley area appears to be very similar to the rocks in the Yolande River and Lynch Creek sections mapped on the Department of Mines MRV Project "Queenstown" sheet. In the Garfield area there is apparently a greater proportion of lavas whereas the other areas of Yolande Sequence have more epiclastics, greywackes and turbidites. The geology of the Garfield area appears generally to be similar to the rest of the MRV south of the South Henty Fault.

The Garfield area does not appear to contain a correlate of the "Comstock Tuff" which would be expected to occur between the Yolande Sequence and the Tyndall conglomerate. However, the andesites mapped within the Garfield Valley occur at a stratigraphic position similar to the Lynch Creek Basalt.

Little hydrothermal alteration was observed within the gridded area. The most obvious alteration is the occurrence of magnetite-quartz-chlorite veins within the Central Volcanics on the eastern side of Clark Valley. These veins are obviously related to the Darwin Granite and are not considered to be of economic significant. Small areas of intense silica-sericite-pyrite alteration occur in and around the andesites, particularly on line 1800N. Along lines 4200N and 4000N, the Ctc is silicified and sericitised, with coarse cubes of limonite after pyrite.

Geological interpretation maps were compiled from the fact maps, the litho-geochemical maps and assisted in part from the petrological descriptions. There were areas where the lithogeochemical map indicated slightly different boundaries to the fact mapping, particularly in areas of poor outcrop. It also suggested some dacites were incorrectly mapped as andesites, particularly near the Thomas Currie Rivulet.

Mapping of the eastern side of the West Coast Range from Mt Huxley to Mount Darwin is on-going.

A complex sequence of volcanic derived conglomerates, sandstones and siltstones and quartz-feldspar bearing lavas crops out on the eastern flanks of the West Coast Range in the Mt Huxley-Mt Darwin area, and can be subdivided into two stratigraphic units.

The Eastern Sequence is a mixed sequence of quartz bearing volcaniclastic conglomerate, sandstone and siltstone with interbedded quartz-feldspar±biotite bearing lavas. It is overlain by the Tyndall Group, a sequence of predominantly pebble-cobble grade quartz bearing volcaniclastic conglomerates with interbedded volcaniclastic sandstone and siltstone. Since both sequences are dominated by abundant quartz-rich detritus correlation in the field can be at times problematic, however the absence of lava units in the Tyndall Group (in this area at least) and the apparent conformable relationship between the upper parts of the Tyndall Group and the Owen Conglomerate can be used as a guide. The nature of the contact between the Eastern Sequence and the Tyndall Group can be inferred as an irregular erosional surface which has subsequently been highly modified by later folding and faulting.

The Eastern Sequence crops out as belt from the King River to near Mt Darwin. It is generally bounded to the west by the feldspar rich Central Volcanics. The contact between these sequences is variable and may be faulted, interfingered and/or unconformable. It is of particular exploration interest as many small mines and prospects (eg. Jukes Pty and Upper Lake Jukes) occur at or near this contact.

The nature of the contact has many stratigraphic implications. At Allens Creek and in the Upper Lake Jukes area small lensoidal units of feldspar phyric lava occur within the Eastern Sequence. *Pemberton and Corbett (1992)* suggest that these may represent an interfingering between the Central Volcanics and the Eastern Sequence and implies that parts of the Eastern Sequence and Central Volcanics are locally contemporaneous. The small units of Central Volcanics at Upper Lake Jukes have also been considered to represent topographic highs around which the Eastern Sequences has been unconformably deposited thus suggesting that the Eastern Sequence may be locally younger than the central volcanics. The problem of the stratigraphic relationship between the Central Volcanics and the Eastern Sequence remains largely unresolved.

Mt Mount Darwin, the Darwin Granite intrudes both the Eastern Sequence and the Central Volcanics and places some timing relationships between the Eastern Sequence and the Tyndall Group.

Rocks assigned to the Tyndall Group are well exposed on the eastern slopes of Mt Huxley. They consist predominantly of pebble-boulder grade quartz bearing volcaniclastic conglomerates with minor interbedded volcaniclastic sandstone and siltstone. To the north east of Mt Huxley they are in contact with the Central Volcanics. The contact is irregular and probably is an unconformity modified by later folding.

A small inlier of Central Volcanics lava crops out on the eastern slopes of Mt Huxley. In contrast to the surrounding Tyndall Group sediments it has abundant hematite veining and sericite alteration. Such alteration is obviously pre-Tyndall Group deposition and the inlier may represent a local pre-Tyndall topographic high.

The upper parts of the Tyndall Group may be partly equivalent to the basal units of the Owen Conglomerate (the Jukes Conglomerate). Sparse quartzite clasts may be found within Tyndall Group volcaniclastic rocks. A significant feature of the Tyndall Group rocks in the South Darwin Peak and Mt Sorell-Mt Strahan areas is the presence of granite detritus. This implies rapid uplift and erosion of the volcanic pile prior to Tyndall Group deposition.

5.2 West Sedgwick

5.2.1 **Rock Chip Geochemistry**

Analysis of the West Sedgwick rock chip results shows that the rocks in this area very compositionally from rhyolites to basalts. Five groups were identified (Plan 17). These groups are:

(i) YRS rhyolitic volcanics
(ii) CVC rhyolites
(iii) CVC dacites
(iv) andesites, including both the Crown Hill type and the Agglomerate Hill andesite
(v) basalt.

The basalts are very distinctive chemically and petrographically. They have a conspicuous amygdaloidal texture. The distribution of the lithogeochemical groups is shown in plan 18.

5.2.2 Soil Geochemistry

Results of the soil geochemistry survey were discussed by *Halley (1992)*. However, a further analysis of the results using the GAS programme is included here. Five distinct geochemical groups could be recognised within the dataset (plan 19):

(i) CVC felsic volcanics
(ii) quartz phyric Comstock Tuff
(iii) a mappable unit within the Comstock Tuff with a relatively mafic provenance
(iv) Agglomerate Hill andesite
(v) hornblende-phyric andesites of the Crown Hill types and derived volcaniclastics.

The distribution of these units is shown in plan 20.

5.2.3 Mapping

A 1:1,000 scale sheet was mapped on the southern slopes of Zig Zag Hill (Plan 21). This area includes the top of the andesite sequence. Agglomerate Hill andesite occurs in the south-west corner of the sheet. It is overlain sequentially by poorly exposed siltstone, a basal quartz-phyric Comstock Tuff unit, a unit within the Comstock Tuff sourced from a mafic provenance, characterised by abundant feldspar phenocrysts and a lack of quartz, and then a thick sequence of typical Comstock Tuff. A major east-west fault is inferred to run across the centre of the sheet. North of the fault, a coarse-grained hornblende-phyric andesite occurs in the north-west corner of the sheet and Comstock Tuff occurs in the north east corner. Between the andesite and the Comstock Tuff is a mixed sequence of andesitic volcaniclastics sourced from the hornblende phyric andesite, siltstone and Comstock Tuff. There is insufficient outcrop to adequately interpret the geology in this sequence. The major east-west fault is interpreted from the displacement of the mafic Comstock Tuff unit and a similar displacement of some unusual amygdaloidal basalts. The thickness of some of the units, particularly the Comstock Tuff, changes significantly across the fault, thus it is interpreted to have a component of Cambrian, syn-depositional movement. This fault has probably controlled the emplacement of the hornblende-phyric intrusive.

An unresolved problem exists in the interpretation between lines 6000N and 6200N. The mafic Comstock Tuff unit on line 6000N apparently correlates with a very similar looking, crystal-rich volcaniclastic along strike on line 6200N. However, the soil geochemistry on line 6200N shows that this rock is in fact chemically similar to the hornblende-phyric andesite. Another problem is the occurrence of a sliver of CVC rocks within the andesites on line 6200N. These features suggest that the E-W fault is not a simple structure.

5.2.4 **Drilling**

Drill logs and assays for holes WS005, 005A and 006 are given in appendix 6 and the interpreted geology is shown on a cross section in plan 23. WS006 passed throught a sequence of coarse grained hornblende-phyric andesites, with major faults at 121.9 to 123.4m and 212.6 to 219.6m. The second fault appears to be the more significant of the two, and is though to be the West Sedgwick Fault. The first fault is probably a parallel structure or a splay. The ground between the faults is very broken. Beyond the second fault is a sequence of interbedded siltstones and felsic epiclastics followed conformably by the Comstock Tuff. The Great Lyell Fault was intersected at 373.0m. A slice of limestone occurred within the West Sedgwick Fault, and the footwall of the fault was quite strongly silicified. This zone was cut and analysed for Au, Ag, Cu, Pb and Zn but there were no significant assay results.

6. RECOMMENDATIONS

The best drill target identified in the Garfield/Clark Valley area from the mapping and soil geochemistry is in the vicinity of the andesites in the Garfield Valley. The encouraging features identified in this area include : an interpreted E-W fault which offsets the andesite; patchy, but locally intense silica-sericite-pyrite alteration, particularly near the fault; Cu values in soils up to 0.48% and Au values up to 0.12 ppm. Detailed 1:1,000 scale mapping is planned in this area to select the best drill site. A helicopter-supported hole of 400 to 500m is planned, probably commencing in early May.

Two drill holes remain to complete the proposed programme in the West Sedgwick area. However, following the intersection of a significant alteration zone in WS007 a down-hole SIROTEM survey will be completed before deciding on the location of the final two holes. At this stage WS007 is yet to be logged or assayed.

7. REFERENCES

Cameron, J. and Read J., 1991. Joint report on Exploration Licences 102/87 Queenstown and 55/89, Mt Darwin, N.W. Tasmania for the year ending 21st March 1991. BHP-UTAH.

Halley, S.W., 1992. E.L.'s 102/87 and 55/89 Queenstown-Mt Darwin area, Annual report for the period April 1991 to March 1992. RGC Exploration.

APPENDIX 1

Garfield-Clark Valley Rock Chip Geochemistry

APPENDIX 2

Garfield-Clark Valley Soil Geochemistry

APPENDIX 3

Petrographic Report, Rocks from South of Queenstown

by

Tony Crawford

APPENDIX 4

West Sedgwick Rock Chip Geochemistry

APPENDIX 5

West Sedgwick Soil Geochemistry

APPENDIX 6

Drill Logs and Assays, WS005, 005A and 006

PLANS 5, 6

LIGHT BLUE	=	YOLANDE RIVER SEQUENCE
PURPLE	=	CENTRAL VOLCANIC COMPLEX
YELLOW	=	EPICLASTICS (BOTH CVC & YRS)
DARK BLUE	=	BLACK SHALE
BLACK	=	ANDESITE

PLANS 7, 8

LIGHT BLUE	=	YOLANDE RIVER SEQUENCE
PURPLE	=	CENTRAL VOLCANIC COMPLEX
YELLOW	=	EPICLASTICS (BOTH CVC & YRS)
DARK BLUE	=	BLACK SHALE
BLACK	=	ANDESITE

PLANS 9, 10, 11, 12

LIGHT BLUE	=	YOLANDE RIVER SEQUENCE	BLACK	=	ANDESITE
PURPLE	=	CENTRAL VOLCANIC COMPLEX	RED	=	OWEN CONGLOMERATE
YELLOW	=	EPICLASTICS (BOTH CVC & YRS)	GREEN	=	PIONEER BEDS
DARK BLUE	=	BLACK SHALE			

PLANS 17, 18

LIGHT BLUE	=	YOLANDE RIVER SEQUENCE
PURPLE	=	CVC RHYOLITE
RED	=	CVC DACITE
BLACK	=	ANDESITE
DARK BLUE	=	BASALT

PLANS 19, 20

BLACK	=	AGGLOMERATE HILL ANDESITE
RED	=	HORNBLENDE-PHYRIC ANDESITE
PURPLE	=	CVC RHYOLITE
GREEN	=	COMSTOCK TUFF-FELSIC PROVENANCE
YELLOW	=	COMSTOCK TUFF-MAFIC

PROVENANCE