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REGIONAL GEOLOGY OF THE MT. READ VOLCANICS
NORTH OF THE PIEMAN RIVER

SUMMARY:

From detailed mapping programmes carried out recently, regional reconnaissance mapping done over previous years, and published sources, a regional correlation of the Mt. Read Volcanics has been interpreted.

Due to lack of information in critical areas (outside the Comstaff tenements), the interpretation is only preliminary. It is merely intended as a guide to the geology, and to enable exploration in the area to have a more reliable basis.

The Mt. Read Volcanics are bounded to the east by Ordovician conglomerates, and to the west by the Owen Thrust, through Chester-Pinnacles, and by turbiditic sediments of the Que Syncline north of Pinnacles.

The Mt. Read Volcanics have been subdivided into two phases by Compa and King, the Primrose Pyroclastics and the Mt. Black Volcanics. In this interpretation a third phase is included being a final phase of sedimentation herein termed the Bulgobac Succession.

This sedimentary phase has been severely broken up by massive acid intrusives, usually quartz felspar porphyry, which can rightly be termed the final phase of the acid volcanism that produced the Mt. Read Volcanics.

WORK COMPLETED:

1. Chester-Pinnacles-East Chester. Detailed geological mapping of grids, creeks, roads, tracks and costeans; diamond drilling at Pinnacles and Chester. Mapping of the HEC Pieman Road.
2. Bulgobac Area. Reconnaissance mapping of the Que River, Emu Bay Railway, Bulgobac Road, and other creeks in the area. Detailed mapping of the Bulgobac Road.
3. Sock Creek and Environs. Reconnaissance stream sampling and mapping; grid mapping and sampling; costeaning; diamond drilling. Mapping and sampling of strike extensions (Hash Creek and Green Creek).

4. DAB and Murchison Highway. Reconnaissance stream sampling and mapping; DAB input anomaly follow-up gridding, sampling and costeaning; recent detailed mapping of DAB costeans and Murchison Highway. Published geological map by Aberfoyle Ltd., of the Que River Mine region.
5. Mt. Block. Original reconnaissance stream sampling and mapping; detailed mapping and sampling on the Mt. Block (DAC) grid; regional scale mapping south of Mt. Block, to Tullah.

THE MT. READ VOLCANICS:

Compana and King (1963) subdivided the acid volcanics into two broad rock groupings, the Primrose Pyroclastics and the Mt. Black Volcanics; which can be clearly seen in the area south of Chester, on the HEC Pieman Road. The older (?) Primrose Pyroclastics are essentially a thick sequence (1500m?) of ash flow and ash fall tuffs, coarse pyroclastics, ignimbrites, rhyolitic lavas, subordinate intrusive porphyries and interrelated marine sediments. The Mt. Black Volcanics comprise a thick (3000m?) sequence of massive andesitic, dacitic, rhyolitic and keratophyric lavas, autoclastic tuffs and ignimbrites.

The major base metal mines of western Tasmania are related to the Primrose Pyroclastics, and in the case of Rosebery, a large Zn-Pb-Ag deposit, it occurs within a finite shale host-rock completely enclosed by tuffs. Obviously the host rock, and the sulphide, was deposited during a hiatus in the explosive volcanic activity that characterised the Primrose Pyroclastics.

The Primrose Pyroclastics occupy the south west portion of the area under review, underlying grid EAD (Perkin, 1977). They extend southwards through Rosebery and on through the Hercules ore deposit. In the EAD grid area there is no direct evidence of any clastic sedimentary units within the pyroclastic sequence. The Chester Pyrite Mine, however, is associated with a massive cherty horizon which has been interpreted by Sangster (pers. comm) as an exhalite unit. In Canada these exhalites are the host of significant base metal sulphide deposits. There has obviously been a significant change in environment from Rosebery to Chester. Rosebery represents a definite break in volcanism, with deposition of clastic sediments, with iron and base metal rich fluids; whereas Chester represents chemical sedimentation with only iron rich fluids. There is no evidence that Rosebery and Chester are chronostratigraphically equivalent.

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North of EAD grid (i.e. north of Hollway Rivulet), there are significant structural and lithological changes. Whereas in Chester the pyroclastic sequence is apparently structurally simple, with only rare acid to intermediate lavas, in the Pinnacles and East Chester areas there is evidence of more lavas and significant folding. A large andesite is present through the centre of the East Chester (EAB) grid, which is interpreted on an anticlinal structure (Hall, 1978), with evidence of trachyandesites and rhyolites. The Pinnacles area appears to be the focus for the folding to the north, evidenced by the Que Syncline, Burns Peak Syncline, Pinnacles Anticline and the East Chester Anticline.

The western portion of the Pinnacles (EAA) Grid is underlain by Primrose Pyroclastics, which include small zones of base metal sulphides, at times quite massive. There is evidence of overturning of the sequence, with west facing, east dipping structures. The geology is complicated by the proximity of the Owen Thrust, which is the western boundary of the Mt. Read Volcanics at this point. The pyroclastics appear to be the steep east limb of the southern part of the Que Syncline.

The Que Syncline is separated from the Burns Peak Syncline by the Pinnacles Anticline (Hall, 1978). The Burns Peak Syncline was interpreted, from work carried out in the East Chester grid area in 1977-1978, as a north east plunging structure. The east limb of the syncline, as exposed in costeans, is a pyroclastic sequence, with two major clastic sedimentary units. These sediments are either absent or poorly developed and exposed on the western limb. Recent work on the gridded area to the north of the main Chester road shows significant development of sediments, with only minor development of pyroclastic units. Faulting has created structural complexity, with local folding. The geology is described in detail in the report on the area (Hall, 1979).

In the Bulgobac area of EL 5/63 part 2, detailed mapping of the Bulgobac track has shown a sequence of essentially clastic sediments, with minor units of acid tuffs. The whole sequence dips and faces west north west and has been intruded by massive quartz felspar porphyries. The sediments are very similar to those on the east limb of the Burns Peak Syncline in the EAA extensions area, but there is no evidence of a synclinal axis. From the bedding-cleavage relationships it is obvious that the whole sequence on the Bulgobac track is the east limb of a northeast plunging syncline.

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Sediments that can be related to those in the Que Syncline, are exposed on the Bulgobac track at the western end. The difference in attitude of these sediments indicate a disconformable relationship. It is inferred that some structural feature has affected the Burns Peak Syncline, either a major fault has displaced it north block west, or the Pinnacles Anticline has plunged out to the north. The sediments of the Que Syncline are interpreted as being younger than those in the Burns Peak Syncline, probably deposited in a reactivated syncline.

In the northern part of EL 5/63 part 3 (Sock Creek - DAB), and the area to the east of the Murchison Highway (Mt. Charter-Que Mine area), there are significant developments of clastic sediments, with minor reworked tuffaceous units and extensive intrusions of massive quartz felspar porphyry. The Que River Beds (Gee et.al. 1970) have been dated from fossil evidence as upper Middle Cambrian to lower Upper Cambrian and consist of black siltstones with subordinate shales. They are moderately to strongly cleaved, almost slate near the DAB grid, and are very pyritic in places. Along the Sock Creek access track and in a roadside quarry adjacent to the highway south of the track, there is significant development of sandstone, with well developed graded bedding and ripple markings, all giving a consistent northwest dip and facing. Minor tuffs and agglomeratic units are present, and are probably submarine ash-flow tuffs. The whole sequence has been invaded by irregularly shaped quartz felspar intrusives, whose form may have been partly controlled by pre-existing faults.

Mineralization in this area occurs at Sock Creek and at the Que River Mine. At Sock Creek, galena and sphalerite occurs with quartz in fractures in both porphyry and sediments, and is probably a late stage hydrothermal phase. The Que River Deposit consists of several lenses of massive sulphides associated with intermediate lavas and pyroclastics, but no sediments. There is a distinct mineralogical difference within the ore shoots, the eastern (S) lens is essentially pyrite and chalcopyrite, with minor galena and sphalerite, and the western (P) lens is essentially pyrite, sphalerite and galena with minor chalcopyrite. The whole sequence dips steeply, and faces west, and is underlain to the east by micaceous sandstones, siltstones, grey to black shales, and foliated acid tuffs, intruded by pyritic and magnetite-bearing dacites. The Que River Beds overlie the sulphide bearing andesites to the west.

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Exploration carried out in the Mt. Block area indicates a significant change in rock types from north to south. There is no evidence of sedimentary rocks or intermediate lavas and intrusives at Mt Block. The access track into the Mt Block grid has created good exposure of the sequence, and it consists almost exclusively of acid lavas and tuff lavas, essentially porphyritic rhyolites. Minor andesite flows are present, but no sediments that can be related to the Que River Beds and associated sandstones. East dipping sediments occur in the eastern portion of the Mt. Block grid (Hall, 1979), and are essentially submarine, high energy environment, shallow water sandstones, greywackes and arkoses.

A major fault is postulated north of Mt. Block, called the Animal Creek Fault, as it parallels that creek east of the Murchison Highway. This fault is interpreted from aerial photographs and can be traced from the Que River northwest of Bulgobac Siding, east southeast across the Highway, along Animal Creek, and possibly through to the Mackintosh River. It appears to have had little effect on the sediments of the Que Syncline, indicating that it predates these sediments. It is possible that there has been a large north block east movement, and the sediments of the Sock Creek-Murchison Highway area are the equivalent of those in the Bulgobac area.

CONCLUSIONS

The subdivision of the Mt. Read Volcanics into two groupings by Compana and King, the Primrose Pyroclastics and the Mt. Black Volcanics, can be shown to be real in the Chester-Pinnacles-East Chester area, and in the Mt. Block area. However, north of the main Chester Road, west of the Murchison Highway, and north of Animal Creek Fault, the lithologies are essentially sedimentary, with pyroclastic units being subordinate. These sediments show great variety of depositional environment, from quiet reducing conditions for the Que River Beds, to very active shallow water conditions for the sandstone units. This implies regular marked changes in water depth indicating a tectonically active period. It was probably during this tectonically active, but relatively quiet volcanically, period that the quartz felspar porphyries were intruded into the sedimentary succession.

A third phase within the Mt. Read Volcanics is proposed, representing the waning volcanic phase and the increasing sedimentary phase, as represented by the sediments of Burns Peak Syncline, the Bulgobac area, and in the Sock Creek-Murchison Highway area. This sedimentary phase is termed the Bulgobac Succession.

As the Que River Beds are related to the Bulgobac Succession, and have been dated as upper Middle Cambrian to lower Upper Cambrian, it implies that the volcanic phases are pre-Upper Cambrian in age.

The sediments of the Que Syncline are younger than the Bulgobac Succession, and were probably deposited in a reactivated pre-existing synclinal structure. Subsequent folding in the Tabberraberan Orogeny has emphasised the synclinal aspect, with the axis paralleling the competent acid volcanics of the Mt Read Volcanics. If the Que Syncline sediments are related to the Dundan Group sediments to the west, it implies that part at least of the Dundan Group is post-Middle Cambrian.

ECONOMIC IMPLICATIONS

All the known mineralization, with the exception of the Que River Mine, is associated with the Primrose Pyroclastics, the early explosive phase of volcanism of the Mt Read Volcanics. No massive sulphides have been discovered in the massive Mt Block Volcanics, with only occasional evidence of sulphide bearing units, e.g pyrite in the massive agglomerate on the HEC Pieman Road east of Farrell Siding. The rocks in the Mt Block area are singularly barren of sulphide, except for traces of disseminated pyrite in some of the sandstone on the east part of the grid area.

The Que River Mine is associated with intermediate lavas and pyroclastics, presumably near the base of the Bulgobac Succession. The only other area of known intermediate lavas is in the East Chester grid area. However, testing of these andesites has failed to indicate the presence of base metal sulphide. Recent geophysical testing (IP) of these andesites may alter these conclusions.

The Bulgobac Succession has been exposed in many areas, and mapping, sampling, costeaning and drilling have failed to find any massive base metal sulphides. The pyrite in the Que River Beds and in the shales at East Chester are purely a function of the quiet reducing conditions of deposition, rather than an influx of sulphidic material into the basin.

The area underlain by the Bulgobac Succession is not regarded as a favourable target for massive volcanogenic sulphide deposits based on the present geological knowledge of the area. The lack of airborne electromagnetic anomalies also downgrades the area, particularly as the Que River Mine was detected during an Input EM survey.

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