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## GEOLOGICAL RECONNAISSANCE OF PART OF THE ARTHUR RIVER AREA

by R. D. McNeil.

### ABSTRACT

The Precambrian System has been divided into four units; the Keith Beds (schists, phyllites), Neasey Quartzites and Slates, Lawson River Siltstone and Rapid River Dolomite. Permian tillite, mudstone and coal bearing sandstone unconformably overlie, and are faulted against the Keith Beds of the Precambrian System, in the eastern part of the area.

Amphibolite dykes are present within the Keith Beds and dolerite and altered dolerite dykes within the Neasey Quartzites and Slates.

The area is very poorly mineralised and there are no economic mineral deposits known.

### INTRODUCTION

This report describes the geology of about 150 square miles of country situated to the south-east of Trowutta and the south-west of Meunna. The Arthur River flows through the northern and eastern parts of the area and the Rapid River skirts the western and part of the southern boundary. The investigation was essentially a reconnaissance and very little detailed mapping was carried out.

Waller in 1901 reported on the Victory Mine at the Arthur River and later Nye in 1924 investigated part of the area for the Hydro-Electric Commission, in connection with a water conservation scheme. He confined his observations to the area in the vicinity of the Arthur River near and north-west of the Victory Mine. No other geological investigations have been carried out within this area.

The mapping in the field was done on a scale of 1:23,760, using the Forestry Commission Trowutta sheet as a base map, and the details were later transferred to a map on a scale of one inch to a mile. The field work was carried out between January 11th and May 1st, 1960, mainly from five base camps, four of which were reached by helicopter. The fifth camp can be reached from a logging road which passes through Takone West.

Access roads are generally poor or non-existent and at present all terminate on the eastern or northern sides of the Arthur River. Several of these logging roads, including one from Takone West, Hilders Road from Meunna, Hardwoods (Aust.) from Lileah, Grays from Trowutta, and Lees from Trowutta, reach, or almost reach the Arthur River, and a rough bridge has been constructed across the Arthur at the end of one of the branches of Hilders Road. An old pack track between Meunna, Folly Hill and Blue Peak can still be followed on foot.

South of the Arthur River there are no tracks of any kind and access is extremely difficult without the aid of a helicopter.

### GEOGRAPHY

Most of this area is between 400 and 800 feet above sea level, although several hills rise to 1200 to 1500 feet above sea level. The country has been deeply dissected in many places and the landscape is still essentially youthful with remnants of the original surface often to be seen.

The vegetation consists of dense rain forest with interspersed button grass and scrub plains. The rain forest varies from open, dominantly eucalypt forest on the small ridges and some hill slopes, to denser myrtle forest in the valleys between. The eucalypt forest generally provides easy walking when the crown cover exceeds 40 to 50%, as this prevents the growth of many secondary species. *Bauera* and horizontal scrub are fairly common west of the Lyons River and are often extremely difficult to negotiate. The button grass plains sometimes provide better walking than the forest but they are often covered with thick, stunted ti-tree which considerably impedes walking.

The Arthur River, which flows to the west, controls the drainage over the entire area. Whereas the Arthur crosses the area from east to west, most of its tributaries, including the Dolly, Holder, Neasey, Lyons and Keith rivers flow northerly or slightly east of north. Thus these tributaries are controlled by the strike of the beds and by the schistosity. Frequently these rivers have cut very deep valleys and flow through steep gorges several hundred feet deep. In the western part of the area, underlain by the Lawson River Siltstone and the Rapid River Dolomite, a few of the rivers flow east-west, sub-parallel to the Arthur River.

Rock outcrops are poor and isolated, except in the main creeks and rivers which traverse the area. Even though the Arthur River crosses the whole area from east to west, good rock exposures are often separated by a mile or more of non-exposure which considerably reduces their value.

## STRATIGRAPHY

### Precambrian System

Quartzites, schists, slates, siltstones and dolomite all probably of Precambrian and/or Lower Cambrian age occupy most of the area. These rocks can be divided into a number of units, each of which will be discussed separately. They are not intended to be formations.

#### *Keith Beds*

The Keith Beds consist of muscovite, chlorite and biotite schists, quartz-mica schists, phyllitic quartzites and quartzites. They occupy the eastern part of the area and form the basement on which the Permian rocks have been deposited. Outcrops are poor and are generally limited to river or creek beds. The best outcrops occur in the Arthur River from half a mile to three miles upstream from the Old Victory Mine, and south of the Permian sediments in the Keith River.

Mica schists and quartz mica schists are the most common rock types present. They are generally fine grained and have abundant mica developed, usually muscovite although chlorite and biotite are occasionally represented. Schistosity varies considerably in intensity and usually has obliterated all traces of the original bedding. Small chevron type folds, a few centimetres in wave length are quite common in certain places.

The thickness of these beds is difficult to estimate but must be several thousand feet at least, and could be as much as two to three miles. The schistosity varies in strike from  $0^{\circ}$  to  $70^{\circ}$  and dips to both the west and east at between  $50^{\circ}$  and  $90^{\circ}$ . Easterly dips are especially common two miles or so upstream from the Old Victory Mine, and a small fold, the axis of which trends  $30^{\circ}$  is exposed in the cliff face about one and a half miles upstream from the Victory Mine.

Quartz veins and segregations are extremely common and are generally aligned roughly parallel to the schistosity.

A small mass of dolomite and pyroxenite has been reported from near the old Victory Mine by Nye (1925) and Waller (1901) but was not seen by the author.

#### *Neasey Quartzites and Slates*

Overlying the Keith Beds are the Neasey Quartzites and Slates. These beds consist mainly of quartzites, slates, quartz phyllites and phyllites, the grade of regional metamorphism varying within the unit but always being considerably less than in the Keith Beds. No true schists occur.

These rocks occur in the area west of the Lyons River, near its junction with Eastern Creek, and east of the Holder River. The eastern boundary is extremely indefinite. They occur on both sides of the Arthur River, underlie the Dip Range and are probably the same series as comprise the Sisters Hills. Outcrop is poor, and limited to the occasional creeks. As most of the creeks run sub-parallel to the regional strike such outcrops are thus of little use in working out the sequence. Although the Arthur River traverses the whole unit, outcrop is limited and patchy throughout. The best and most easily accessible outcrops occur in cuttings of Hilders Road, west-south-west of Preolenna.

# GEOLOGICAL SKETCH MAP ARTHUR RIVER AREA

0 2 4 MILES

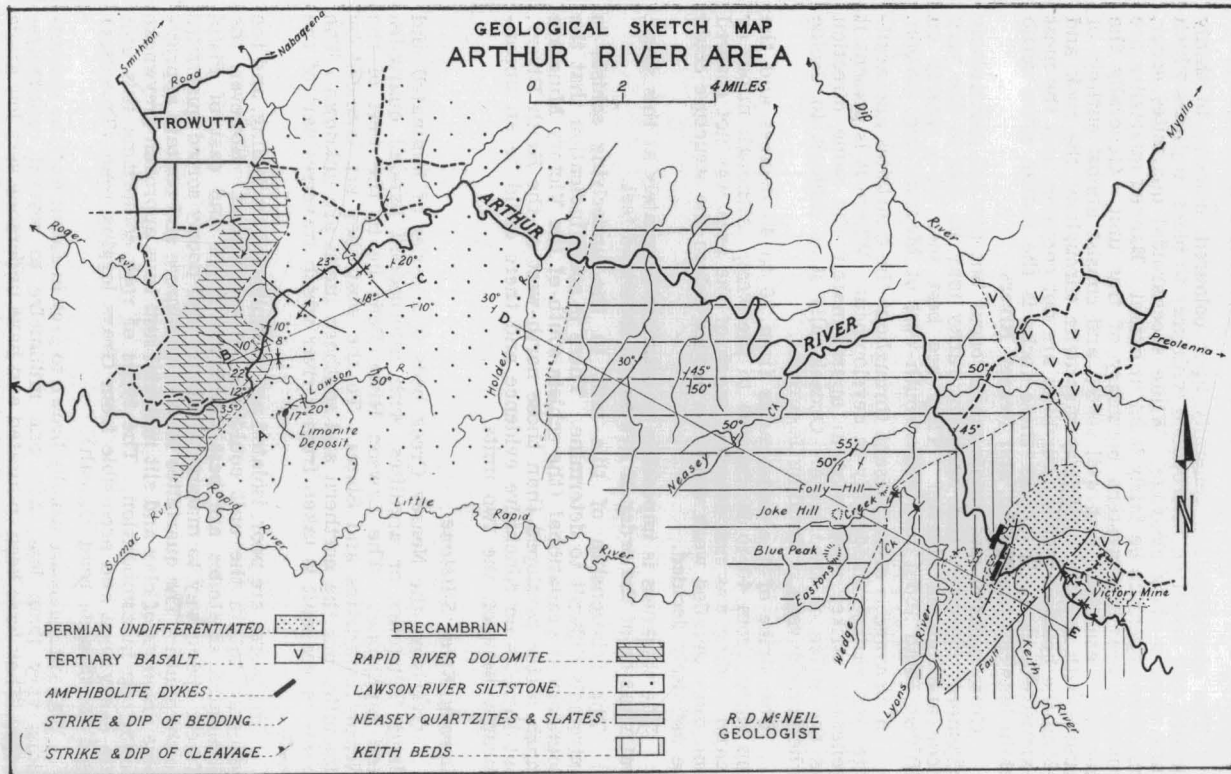


FIGURE 8.

5 cm

The quartzites are generally light coloured, massive to thinly bedded and are often interbedded with grey to black argillites which may show a slaty cleavage. White saccharoidal quartzites occur, but they appear to be fairly local in extent. Banded quartzites are common near the western boundary of this unit. Generally the quartzites are clean and well sorted and consist almost entirely of quartz with a little subsidiary muscovite throughout the rock and along the bedding planes. Phyllites are not common, and the most extensive area underlain by these rocks is the button grass scrub plain between the Holder and Neasey Rivers.

Cross bedding and ripple marks occur but are not particularly common. However, this apparent rarity may be due to the very poor and broken outcrop. They are best seen in a quarry on Hilders Road about four miles south-west of Meunna trig. station.

A cleavage is often present throughout the quartzites and argillites but varies considerably in development. Where it is present it generally strikes north-east in approximately the same direction as the strike of the strata. Occasionally it is difficult to decide whether cleavage or bedding is present.

The strike of the beds varies from 10 to 45 degrees and the dip varies from 40 to 90 degrees to the west. Although minor or major folding was not detected, much of the area was not covered and more detailed work would be needed before the structure could be definitely decided.

The thickness is impossible to estimate accurately at this stage, but must be of the order of five to ten thousand feet.

The relationship of this unit to the underlying schists is extremely difficult to determine. There is some indication that the boundary is gradational (the schists south of the Victory Mine are much better developed than those north-west of the Keith River), but there is no conclusive evidence and there could be an unconformity between the two units.

#### *Lawson River Siltstone*

Overlying the Neasey Creek beds is a series of laminated and flaggy siltstones or argillites, with interbedded banded quartzites and sandstones. The Lawson River Beds lie to the west of the Neasey Quartzites and Slates. To the west they are bounded by dolomites but the northern and southern limits are unknown. The name of the unit is taken from a river which traverses part of the series.

Exposures are poor, isolated and complicated by folding, and the sequence within the unit could not be established. However, the laminated siltstones are best developed north and east of Pistol Creek, giving way to massive siltstones and poorly sorted quartzites to the south. The quartzites tend to be impure and contain appreciable amounts of clay and silt material and thus approach greywacke sandstone in composition. The types of rock comprising this unit are easily seen and accessible from Grays logging road (Trowutta) and Hardwoods road (Lileah).

The siltstones are usually brown to grey in colour and the laminations vary from less than one millimetre to several centimetres wide. They have been indurated and have undergone very low grade thermal metamorphism. The degree of metamorphism is always

lower than in either of the two previous units. A distinct cleavage is often developed and it may be either a slaty cleavage or more often a fracture cleavage (in de Sitter's, 1956, sense). Where the fracture cleavage is developed it is in the non-laminated bands of siltstone (two to three feet thick) between laminated bands of siltstone. The siltstones also possess such intraformational structures as cross bedding and slumping.

The bedding varies in strike considerably, and practically all compass directions are represented. This is in marked contrast to the constant strike of the Neasey Creek Quartzites and Slates. Dips are usually small, about 20 degrees, and the largest dip measured was only 50 degrees.

Greywackes occur in association with siltstones, slates and cross bedded quartzites in a creek section near 9352, 3212. They also occur in the central part of the Lawson River. Several specimens from this section have been described by G. Everard:—

I.—

“Fine grained dense pale grey rock, with planar orientation shown by black slate inclusions 1 mm.-1 cm. long.

In thin section the rock consists of angular fragments up to 0.1 mm. in length of quartz, feldspar and sericite in a very fine grained matrix. The white mica fragments show planar orientation in a more marked manner than the black fragments.

The rock is a sheared arkositic greywacke.”

II.—

“Medium to fine grained pale grey rock with strong hexagonal jointing. It weathers a yellowish brown due to light iron staining. The specimen has a somewhat mottled appearance, due to a granular structure, with greyish grains one to two mm. across, very strongly cemented together by a pale yellowish interstitial material. Minute pores are very numerous and are only partly due to the weathering out of iron ore mineral, a few small dark grains of which still remain.

In thin section the granular structure is hard to detect, being only suggested by the innumerable pore spaces and differential staining of limonite. The grains themselves are composed of minute angular fragments of quartz, feldspar and sericite in a very fine matrix of a similar nature.

The rock is an arkositic greywacke that has been granulated and recemented.”

The latter specimen has quite distinct hexagonal jointing, the joint prisms being two to three inches in diameter. Several beds of this type of rock are present and all are characterised by strong hexagonal jointing. There are no partings parallel to the bedding or anything suggestive of bedding within these members, and thus in hand specimen they resemble a weathered acid lava.

There are no indications that basic lavas are present.

Sole markings are well developed in these sediments near the junction of the Lawson River and its most westerly tributary. Flute casts and flame structures occur on a relatively large scale

(approximately one inch across) and indicate currents from the north-west.

Although greywackes are not present in other areas where this unit outcrops, there is not enough evidence at present to separate the sequence in which greywackes occur from the main unit, the Lawson River Siltstone.

The thickness of this unit can only be estimated and is probably of the order of several thousand feet. The Lawson River Siltstone appears to be lithologically similar to the Cowrie Siltstone of Spry (1957) although the southern area of quartzites appears to have some characters in common with the Bryant Hill Quartzite of Carey and Scott (1952).

#### *Rapid River Dolomite*

A relatively large area of dolomite and associated cherts occurs in the north-western corner of the area mapped. Good exposures occur in the Rapid River, about three-quarters of a mile upstream from its junction with the Arthur River, and in the Arthur River itself about two to two and a half miles upstream from the Arthur-Rapid junction.

The Rapid River Dolomite appears to conformably overlie the Lawson River Siltstone and consists of grey to white dolomite, cherts, indurated cherty slates and chert breccias. The slates and cherts are frequently interbedded with the dolomite, a very good example of which can be seen in the Rapid River. The cherts are massive, fine grained, dark coloured and possess similar jointing and texture to the surrounding dolomite. Carey and Scott (1952) suggest that similar cherts in the Nabageena-Smithton district are the result of partial or complete silicification of individual beds or bands of dolomite. However, the interbedded laminated cherts appear to the author to be original. They are very finely bedded and often have considerable mica on the bedding planes.

The dolomites are fine to coarse grained, frequently mottled and thickly bedded. Caves are present south of Trowutta and wherever the dolomite occurs in the river it has been extremely corroded and channelled.

G. Everard, Mineralogist and Petrologist, reports on a dolomite sample:—

“Medium grained, grey carbonate rock with irregular mottlings and veins of white carbonate.

Under the microscope the dark carbonate shows patches of crystals averaging about 1 mm. across, and very fine grained crystalline patches with grains averaging 0.05 mm.

The white carbonate shows secondary depositional structures and in the mass is relatively opaque and white”.

The thickness appears to be of the order of a thousand feet, but at this stage no reliable estimate can be made.

The Rapid River Dolomite is probably partly or wholly equivalent to the Smithton Dolomite of Carey and Scott, from the Smithton District.

### Permian System

The Permian sediments are confined to the far eastern part of the area, where they rest unconformably on the Keith Beds of the Precambrian System. Except for a small area between the Arthur and Lyons Rivers the system is confined to the east of the Arthur River. A complete section is not available but the thickness of the system in the vicinity of the old Victory Mine is not less than 700 feet. Here the Permian can be divided into five formations:—

Name	Thickness in feet	Correlate at Quamby Bluff
Relapse Sandstone	100+	Liffey Sandstone (250')
Campbell Formation—		
Siltstone, Mudstone		
member	200+	Golden Valley
<i>Fenestella</i> shale member	20	Formation (200')
Takone Mudstone	210	Quamby Mudstone (350')
Victory Tillite	140+	Stockers Tillite (45')

The only formations exposed on the western side of the Arthur River are the Victory Tillite and the Takone Mudstone, the Campbell Formation and Relapse Sandstone being confined to the eastern side. The best section is exposed in cuttings on the road from Takone West to the old Victory Mine. The base of the system appears to be faulted and the Relapse Sandstone does not appear in this section. However, the latter formation is exposed on the downthrown side of large fault to the north of the Victory Mine.

The uppermost beds of the Permian System were not seen and probably do not occur within this area.

#### Victory Tillite

The Victory Tillite unconformably overlies the Keith Beds of the Precambrian System and conformably underlies the Takone Mudstone. It is a very poorly sorted glacial conglomerate, grey-brown in colour and unfossiliferous. Pebbles occasionally striated, are extremely abundant, often comprising 20 to 30% of the rock. They are sub-angular to sub-rounded and range from small particles 1 to 2 mm. across to boulders up to 20 to 30 inches in diameter. The pebbles are generally of quartz and quartzite but occasionally schist and siltstone are represented. The attitude of the pebbles appears to be entirely haphazard. Bedding is completely absent in the basal part of the formation, but near the base of the Takone Mudstone it is occasionally present, although very poor and irregular.

The Victory Tillite is at least 140 feet thick at the type section and may be much more. It can be correlated on lithological grounds and stratigraphic position with the Wynyard Tillite of Hills and Carey (1948) and the Stockers Tillite of Wells (1957).

#### Takone Mudstone

The Takone Mudstone conformably overlies the Victory Tillite and conformably underlies the *Fenestella* shale member of the Campbell Formation. It consists of apparently well sorted bluish grey mudstone and siltstone, prone to spheroidal weathering. Bedding is poorly developed especially in the lower part of the formation. Pebbles are not abundant except towards the base where the Takone Mudstone grades into the Victory Tillite. Fossils are



rare and generally unidentifiable but a well preserved productid brachiopod was found on the bank of the Arthur about five chains below the Victory Mine. The formation is 210 feet thick and is probably equivalent to the Quamby Mudstone of Wells (1957) and Unit B of Hills (1913).

#### *Campbell Formation*

Conformably overlying the Takone Mudstone is a formation of fossiliferous shale, and relatively unfossiliferous siltstones and mudstone. This formation can be divided into two members; a lower unit of extremely fossiliferous calcareous shale, (*Fenestella* shale member), and an upper unit of massive siltstone and mudstone. The *Fenestella* shale member is about 20 feet thick and contains abundant fenestellids, productids, stenoporids, pectens, &c. The upper unit is probably in excess of 200 feet thick (the top is not exposed), and contains a few brachiopod shells. A few pebbles are present throughout the formation. The Campbell Formation is correlated with the Golden Valley Formation of Wells (1957) and Unit C of Hills (1913). The *Fenestella* shale member of the Campbell Formation possibly corresponds with the basal coquina limestone in the Golden Valley Formation of Wells (1957).

#### *Relapse Sandstone*

Conformably overlying the Campbell Formation, is a formation of interbedded quartz sandstone and micaceous thin bedded shale. The formation is greater than 100 feet thick and consists mainly of massive yellow brown to white sandstone. It is cross bedded and contains abundant carbonaceous laminae on some horizons. Part of a coal seam is exposed in the upper reaches of Relapse Creek, about one mile north of the old Victory Mine. The equivalent formation at Preolenna (Unit D of Hills 1913) contains several coal seams and it is probable that more than one is represented here. The top of the formation is not exposed.

The Relapse Sandstone is also probably equivalent to the Liffey Sandstone of Wells (1957).

### IGNEOUS GEOLOGY

Dolerite, altered dolerite, and amphibolite dykes are the only igneous or formerly igneous rocks present. They appear to occur in the form of dykes, which are generally five to 100 feet wide, and strike approximately north-south. The amphibolite dykes are confined to the Keith Beds and the dolerite and other basic dykes occur in the Neasey Creek Quartzites and Slates. No dykes were seen in the Lawson River siltstone but they probably do occur within this unit.

G. Everard, Petrologist and Mineralogist, described two specimens from amphibolite dykes. Unfortunately none of the dykes from within the Neasey Creek Quartzite and Slate have been subjected to a petrological examination.

Specimen I comes from two and a half miles downstream from the Victory Mine.

Specimen II comes from one and a half miles downstream from the Victory Mine.

I.—

“The specimen is a fine to medium grained, greenish, granular rock with strong shearing. Elongated aggregates of hornblende, feldspar and epidote are visible in hand specimen together with occasional octahedra of magnetite.

In thin section the rock consists of granoblastic and glomeroblastic feldspar and deep green, strongly pleochroic, fine acicular hornblende, in approximately equal amounts. Magnetite occurs as scattered idiomorphic crystals of relatively large size. Patches of epidote about 2 mm. across occur usually with a little quartz mosaic.

The feldspar has a refractive index usually lower than that of Canada balsam, and is therefore albite. It occurs in allotropic grains or groups of grains and may be crowded with granules of epidote and fine needles of hornblende. These minute inclusions show lineation which is not parallel to the general lineation of the rock. This lineation is the same for the contiguous grains of a single group. No twinning is shown by the albite.

The rock is an amphibolite, the feldspar of which has been altered to albite.”

II.—

“Medium to fine grained, somewhat sheared, greenish grey rock with disseminated pyrites. The specimen sparkles with the cleavage faces of innumerable minute feldspar crystals. Lineation is shown by acicular hornblende and elongated opaque white grains.

In thin section a granoblastic and glomeroblastic texture is shown somewhat similar to that of No. I except that the proportion of feldspar to ferromagnesian is higher. The feldspar grains, moreover, are larger and freer from inclusions which consist of fine hornblende needles and indicate rotation and recrystallisation in the same way as in No. 13. Ilmenite is fairly common, but there is much more opaque white leucoxene in irregular, elongated grains, and brown limonite. Much of the green, strongly pleochroic, hornblende has been altered to fine granular carbonate.

The rock is an albitised amphibolite, the amphibole of which has been largely carbonated.”

## STRUCTURAL GEOLOGY

### Structure of the Permian

#### *Faulting*

The lack of detailed stratigraphy has prevented the finding and mapping of Tertiary faults over much of the area. The only part of the area where faults have been mapped is in the east, where a major fault down-throws the Permian rocks against the Keith Beds of the Precambrian System. This fault trends 40 to 45° and

has a downthrow of about 600 to 800 feet to the north-west. It cuts the Arthur River about 100 yards north of the old Victory Mine.

The boundary between the basal Permian sediments (Victory Tillite) and the Keith Beds on the road from Takone West to the Victory Mine, appears to be faulted. This fault trends just south of east and is downthrown to the north by an unknown amount.

### Structure of the Precambrian

The Precambrian rocks within this area appear to form the limb of a large synclinorium, the axis of which probably occurs just to the west of the area mapped. Thus, the youngest beds occur to the west and the oldest to the east.

#### *Keith Beds*

These beds are the oldest in the area, and consist of low grade regionally metamorphosed rocks, mostly schists. They have a very well developed schistosity, which varies quite considerably in trend from about  $0^{\circ}$  to  $70^{\circ}$ . After the development of the schistosity, during some later period of folding, the schistosity has acted as bedding and been folded into a series of small, often complex folds. One such fold is exposed in the Arthur River above the Victory Mine. Original bedding is seldom recognisable except towards the western boundary of the unit. It was not recognised at all east of the large fault which downthrows Permian against Precambrian.

#### *Neasey Quartzites and Slates*

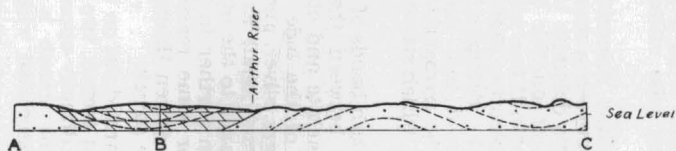
The Neasey Beds are a series of conformable quartzites, slates and phyllites. They have been folded and have a remarkably consistent strike, between  $10^{\circ}$  and  $45^{\circ}$ . Dips are always to the west and greater than  $40^{\circ}$ . Vertical beds or near vertical beds are not uncommon. As no folds were recognised and it appears unlikely that the beds are a uniformly dipping series, the folds must be isoclinal or at least overturned to the extent that both limbs dip to the west. A well developed cleavage is frequently present, generally trending in approximately the same direction as the bedding.

#### *Lawson River Siltstone and Rapid River Dolomite*

The only open folding into anticlines and synclines was found in the western part of the area in the above units. Both an anticline and a syncline, trending approximately north-west, were definitely identified and another syncline inferred. The folding is not particularly strong and dips are seldom above  $25^{\circ}$ . The folds plunge both north-west and south-east. The Lawson River Siltstone often has a weak cleavage associated with it, generally of the fracture cleavage type (de Sitter, 1956). Small folds, the axes of which plunge at about  $30^{\circ}$  to  $45^{\circ}$  to  $320^{\circ}$  or  $330^{\circ}$ , can be seen in the Rapid River Dolomite in the Rapid River.

GEOLOGICAL SKETCH SECTIONS  
ARTHUR RIVER AREA

0 1 2 MILES



SECTION A-B-C



SECTION D-E

PRECAMBRIAN

RAPID RIVER DOLOMITE



LAWSON RIVER SILTSTONE



NEASEY QUARTZITES & SLATES



KEITH BEDS



PERMIAN UNDIFFERENTIATED



R. D. McNEIL  
GEOLOGIST

FIGURE 9.

5 cm

## ECONOMIC GEOLOGY

### The Victory Copper Mine

This old mine is situated in the valley of the Arthur River, about five to six miles west of Takone West. The river flows a little west of north there and the mine is situated on the eastern bank. It can be reached via a logging road from Takone, which extends almost to the river bank. The present examination was brief and uninformative, as all the old adits are now inaccessible. The following description of the mine is taken from a report by G. A. Waller, Assistant Government Geologist, who visited the mine in 1901.

He reports a belt of white crystalline dolomite in the mine, striking  $30^\circ$ , and forming the contact between a mass of pyroxenite and highly laminated quartz schist. This dolomite is fifty feet wide at the water's edge but does not appear on the other (western) side of the river. Half a mile further north it has widened to several hundred feet. To the west of the dolomite there is a mass of pyroxenite, which, in the vicinity of the dolomite, is in a highly decomposed condition. Waller considered that the origin of the dolomite was directly connected with the pyroxenite. The eastern wall of the dolomite is quartz mica schist, which strikes approximately north-south.

The deposit of copper is associated with bands of black hematite, and apparently forms a contact lode between the dolomite and schist. The copper ores consist of malachite and chalcopyrite, distributed through the dolomite gangue of the lode. Waller quotes assays of 22.4% copper, 8 ozs. 3 dwts. 8 grs. silver, and 10 dwts. 4 grs. gold. Apparently the ore body was very small as nearly all the copper ore was broken down in the entrance to the tunnel, which was put in to explore the deposit. The vein further in was then found to consist entirely of hematite and for some reason or other the tunnel was turned to the west and then driven through the dolomite for some distance. No other veins were struck.

A little exploration work has been carried out on the western side of the river, and the author noted that a trench, two to three chains long, had been dug along a small ridge directly opposite the Victory Mine. However, the bedrock along this trench is a quartz mica schist and there is no mineralisation associated with it.

Exploration in the Victory Mine was never carried far enough to determine whether or not the copper ore existed further along the contact zone (dolomite and schists).

### Gold

Small amounts of alluvial gold occur along the Arthur River between the Hellyer and Lyons Rivers. However, no economic deposits have yet been discovered.

### Folly Hill Workings

Folly Hill is situated some four miles north-west of the Victory Mine. This, and the neighbouring Blue Peak area, have been worked for gold spasmodically for the last 50 years, but there are no records of any production.

The deposits are poorly cemented alluvial sands, probably of Late Tertiary or Pleistocene age, with occasional bands of pebble conglomerate and breccia through them. The sands appear to be up to 30 feet thick and are poorly sorted and angular.

Numerous shallow shafts were sunk in about 1935 and an attempt was made to begin sluicing the sand. At about the same time a pack track from Meunna was opened up and a large hut built at the site. To obtain water for sluicing, a dam, six feet high and 30 feet long was constructed in a small creek about half a mile west of the workings, and a nine inch pipeline laid from the dam. It is extremely doubtful, however, that there would be enough head of water, except in winter time, and even then a dry spell of a few days would cause operations to cease. Only a very small volume was washed before operations were abandoned, probably due to the lack of economic minerals.

A sample collected there during this investigation was panned, and studied under the microscope, but no gold, tin or other economic minerals were found in it.

### Coal

Several square miles of potential coal bearing country exists to the north of the Victory Mine. It is traversed by Relapse Creek, in which coal has been reported. The quality of the coal is similar to that at Preolenna, but the thickness and number of seams is not known.

### Limonite

A small area of secondary limonite, one chain wide by two chains long, was discovered near one of the tributaries of the Lawson River (see map). No bedrock could be found and the source of the limonite is not known.

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**Appendix**

by G. Everard.

Two specimens from "dolomite" mass on the Arthur River.

Fine to medium grained, pale grey siliceous rock. The rock is not uniform in colour the tendency being towards greenish patches in a paler matrix.

In thin section the rock consists of angular quartz and (to a lesser extent) feldspar of an average grain size 0.02 mm. in a finer grained matrix. Opaque magnetite, ilmenite and leucoxene occur in irregular crystals. Irregular wisps of chlorite mottle the rock and suggest an original fabric, altered by metasomatism and recrystallisation.

**Lawson River No. 7.**

Pale grey, fine grained rock showing bedding.

In thin section is seen a fine even grained aggregate of quartz, feldspar, sericite, carbonate and dark and light coloured opaque angular fragments. Average grain size is about 0.1 mm.

The rock is a greywacke.