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WESTERN MINING CORPORATION (TAS) PTY. LIMITED

EXPLORATION LICENCE NO. 16/76

AVOCA, TASMANIA

REPORT FOR SIX MONTHS

FROM: 2nd August, 1976.

TO: 2nd February, 1977.

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INTRODUCTION

Exploration Licence 16/76 was granted on the 29.7.76 for six months up to 2.2.77.

Exploration expenditure for the six months was \$10,368. The exploration program was carried out to follow up the coal occurrences which exist in small workings, mines and outcrop in the area. This involved literature research, reconnaissance and detailed mapping with some coal sampling for analysis.

The licence covers 828 sq. kms. and is situated approximately 70 kms. south-east of Launceston in the north-eastern quadrant of Tasmania.

The area consists of dissected topography varying from plateau country up to 900m. above sea level, to major valleys 200m. above sea level.

The South Esk and St. Pauls Rivers are the major permanent rivers in the area and flow westerly. Several minor rivers which flow for most of the year feed these two rivers.

Campbell Town and Avoca are the two main towns which service the area. Sealed and unsealed roads also exist especially in the valleys which are generally cleared and cultivated. The plateau areas are traversed by logging tracks and a few bush tracks and are generally uncleared supporting various eucalypts.

The Permian-Triassic boundary passes
through the lower part of the
upper Permian Super group. The
basal division of the U.P.S.G. is
in fact Permian in age.

A branch railway off the Launceston-Hobart railway runs from Conara Junction in the west through Avoca and terminates at St. Marys near the east coast.

Mapping was carried on 1:40,000 scale aerial photographs and transferred on to 1:50,000 scale topographic base plans.

REGIONAL GEOLOGY

The Avoca area is situated on the north-eastern flank of the Permo-Triassic Tasmania Basin. *no such thing?*

The Permo-Triassic basement consists of the ?Silurian Mathinna Beds which have been strongly folded (NW trending fold axis) during the Tabberabberan Orogeny and later intruded by the Devonian Ben Lomond Granite.

The Devonian and Silurian rocks were then peneplained and unconformably overlain by up to 150m. of marine and fresh water Permian sediments overlain by up to 300m. of fresh water Triassic sediments including coal measures. The Triassic and Permian sediments in the area form the upper and lower parts respectively of the Parmeener Super Group. *NO! NO! NO!*

The Triassic Coal Measures are widespread within the Tasmania Basin and the coal seams are generally more prevalent towards the top of the Triassic sequence.

Significant coal measures have been recorded from two horizons within the Permian sequence of the Tasmania Basin, however, their existence has not been indicated in this area.

↓ does not exist

Dolerite intruded the Permo-Triassic sequence during the Jurassic time probably along existing fault lines in the basement. The dolerite most commonly exists in the upper horizons of the Triassic sequence as a sill or transgressive sill structure in this region.

Block faulting then occurred in early Tertiary times resulting in the erosion of most of the Permo-Triassic sequence east of the Castle Carey Fault, exposing the pre-Permian basement rocks.

The early Tertiary faulting away from the Castle Carey Fault appears to be characterized by step faults down-thrown to the east.

Tertiary sedimentation is essentially confined to the Valleys of the South Esk and St. Pauls rivers and the Tertiary Launceston Basin to the west.

Tertiary basalt exists in the South Esk and St. Pauls valleys and appears to have flowed from a source in the Launceston Basin to the west.

The valley floors are commonly covered by recent soils, alluvium and river gravels whereas on the slopes dolerite scree is prevalent.

STRATIGRAPHY

Emphasis in mapping the area was placed upon the Triassic sediments and their relationship with the Jurassic dolerite,

consequently description of the other units is only treated briefly.

PRE-PERMIAN (BASEMENT)

The ?Silurian Mathinna Beds and the Devonian Ben Lomond Granite form the basement rocks and are unconformably overlain by the Permo-Triassic sequence.

The Mathinna Beds outcrop east of the Castle Carey Fault in the Storeys Creek and Rossarden area south to the Royal George area. The sediments have been strongly folded as a result of the Tabberabberan Orogeny with characteristic NW trending fold axes predominating.

The Devonian Ben Lomond Granite has intruded the Mathinna Beds and forms very prominent outcrops east of the Castle Carey Fault. Tin and tungsten mineralization in the Mt. Rex, Storeys Creek, Rossarden and Royal George areas east of the Castle Carey Fault occurs in association with this granite.

PERMIAN (LOWER PERMIAN SUPER GROUP).

Approximately 150m. of marine and fresh water Permian sediments unconformably overlie the Silurian-Devonian basement rocks in the area.

Outcrops of Permian are more common east of the Castle Carey Fault outside the area mapped, however, they are not continuous in this region due to Tertiary erosion.

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The Permian can be expected to be continuous west of the Castle Carey Fault and in the area south of Royal George where Triassic sediments and Jurassic dolerite overlie the Permian.

The main occurrence of outcropping Permian west of the Castle Carey Fault is north of Avoca and abutting the fault. Minor Permian occurrences exist south of Benham also adjacent to the Castle Carey Fault.

The Permian sequence in the region has been subdivided into five units, the Prospect Creek Mudstone, Mistletoe Sandstone, Burnt Gully Limestone, Castle Carey Mudstone and Aberfoyle Formation. A description of each unit occurs in Blisset 1959.

These units have not been differentiated in the mapping within the area.

TRIASSIC (UPPER PARMEENER SUPER-GROUP)

Drill hole information in the Stanhope area indicates that the Triassic sediments within the area are apparently 300m. thick. No bore holes in this region have penetrated the whole Triassic section and exact thicknesses are not available.

Due to the occurrence of faults and the absence of continuous outcrop, the measuring of a Triassic section could be misleading and was not attempted.

Blisset (1956) subdivided the Triassic sediments of this region

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into the Feldspathic Sandstone and the Ross Sandstone. This nomenclature is considered obsolete and the Triassic is now referred to as the Upper Parmeener Super-Group with no further subdivision. NO' NO' NO'

Generally within the Tasmanian Triassic sequence the sandstone are more quartzose towards the base and coal seams are more prevalent towards the top of the sequence.

Coal drilling in the Stanhope area indicates that the coal seams are contained within the upper 200m, of the Triassic section; the lower 100m, being essentially quartzose sandstones.

Variations do exist, however, and quartzose sandstones have been found in association with coal seams.

Threader (1968) has shown in the Fingal area from drill core information that the Triassic is composed of a series of sedimentary cycles. These cycles consist of coarser sandstones grading upwards into finer sandstones then into siltstones, mudstones and are terminated by a carbonaceous mudstone or a coal seam.

The whole of the Triassic is considered to be non-marine in origin and formed probably in a fluvial and lacustrine environment across the whole of the Tasmania Basin.

Outcrop of Triassic sediments within the area is poor due to abundant Cainozoic cover.

Above 300m. above sea level dolerite talus covers most of the potential Triassic outcrop. In these areas outcrop is usually observed in deep creeks, however, some highly indurated sandstone horizons do outcrop on the slopes. These high relief areas are confined to a strip west and adjacent to the Castle Carey Fault and most of the area east of the Castle Carey Fault.

In areas where the Triassic occurs below 300m. above sea level outcrops are covered to a lesser extent by dolerite scree but to a larger extent by Tertiary sediments and basalt, alluvium and swampy loam. Outcrops are observed along incised creek beds and exposed in land slumps. Rarely the more indurated sandstones outcrop on the valley floors and flanks. These lower relief areas are essentially west of the Castle Carey Fault with a small area east of the Castle Carey Fault south of the Lewis Hill Homestead.

Silicified Triassic sediments can be observed as scree close to their contact with the overlying Jurassic dolerite and in creek beds which cross the contact. The scree consists of red, black and grey silicified sediments often showing distorted laminations.

The silicification probably occurred to fragments of Triassic sediments which were in contact with the dolerite when it intruded.

The Triassic coal measure sequence in mapping the area has been subdivided into a number of facies; the coal/carbonaceous shale facies; mudstone facies; lithic sandstone/siltstone facies and the quartzose sandstone facies.

COAL AND CARBONACEOUS SHALE FACIES

The Coal and Carbonaceous Shale facies is extensive within the area and can be expected to exist along with the other facies beneath the Jurassic dolerite in areas where the intrusion is of a sill form of a minor transgressive nature.

Coal and carbonaceous shales have been located beneath the margins of the dolerite where the Triassic outcrops occur beneath thin talus.

Coal occurrences within the area are known at Stanhope, Bonneys Plains, ^{Buena} ~~Bona~~ Vista, [south of Royal George] and the Lewis Hill area. ← Adjacent to the exploration licence area coal is currently worked at Fingal and has been worked in the past at Ben Lomond and Merrywood.

Up to six seams of coal varying from 1m. up to 4m. in thickness have been recorded within the area of the exploration licence.

Coal mined from the Stanhope and Bonneys Plains area is generally ? reported as being of lower ash content and higher specific energy than the other Triassic coals of Tasmania. The coal also is brighter in appearance and has been reported to have certain coking properties.

Preliminary analysis carried out on coal samples collected from the surface gave swelling indices of up to 6 and ash contents varying from 7% - 19%. (Table 1). The coal and carbonaceous shale facies have low resistance to weathering and erosion and are therefore only exposed on steep slopes where relatively fresh

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rock surfaces become exposed. Lower relief areas are covered by soils and weathering is deeper therefore establishing the existence of this facies in these areas could only be achieved by drilling.

TABLE 1.

AVOCA COAL ANALYSIS
(SAMPLES COLLECTED IN THE FIELD)

<u>SAMPLE NO.</u>	<u>TOTAL MOISTURE</u>	<u>INHERENT MOISTURE</u>	<u>ASH</u>	<u>VOLATILE MATTER</u>	<u>FIXED CARBON</u>	<u>CRUCIBLE SWELLING NUMBER.</u>
A1	2.5	2.1	14.4	32.0	51.5	1
A2	3.1	2.1	10.8	31.0	56.1	1
A3	2.4	2.0	7.6	35.9	54.5	6
A4	6.2	3.4	7.4	33.9	55.3	0
A5	2.9	1.9	7.2	33.0	57.9	1
A6	3.1	2.2	16.1	27.9	53.8	½
A7	3.4	2.1	15.8	27.4	54.7	½
A8	3.9	2.6	18.8	28.8	49.8	0

Proximate Analysis on an Airdried basis.

<u>DESCRIPTION</u>	<u>LOCATION</u>
A1 Interbanded dull and bright coal with some very bright coal.	New Stanhope Mine
A2 Interbanded dull and bright coal with some very bright coal.	New Stanhope Mine
A3 Interbanded dull and bright coal with some very bright coal.	New Stanhope Mine
A4 Interbanded dull and bright coal.	Old Stanhope Mine
A5 Interbanded very bright and dull coal.	Bonney Plains
A6 Dull coal with few bright coal bands.	Bonney Plains
A7 Dull coal with few bright coal bands.	Lewis Hill
A8 Interbanded dull and bright coal.	Lewis Hill

MUDSTONE FACIES

The mudstone facies can be observed throughout the area and is

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commonly associated with the coal and carbonaceous shale facies, and the lithic sandstone and siltstone facies.

The mudstones commonly greys and greens are soft and crumble on exposure to the atmosphere.

Outcrops of the mudstone facies are observed in landslumps and in incised creeks.

Weathered mudstones are vari-coloured, red, brown, yellow, purple, green and white. This weathering feature can be observed in the adits at the north eastern end of Bonneys Plains where there is a white predominance. Kunkar material is present adjacent to the adits and this material can also be observed south west of Avoca just beneath the dolerite.

LITHIC SANDSTONE AND SILTSTONE FACIES

The lithic and siltstone facies is common throughout the area and outcrops in association with the mudstone facies in landslumps and creek beds.

The coal and carbonaceous shale facies commonly occurs in association with the lithic sandstone and siltstone facies which forms the roof of the coal seams.

The lithic sandstone are fine to medium grained containing varying proportions of quartz, mica, rock fragments, feldspar and carbonaceous flecks. The non-quartz fraction is greater than 25%.

The siltstones and sandstones weather similarly to pale browns, yellows and whitish brown and are soft to friable when wet. The fresh material is generally pale grey and moderately hard to very hard.

Cross bedding is common in the lithic sandstones, whereas fine laminations are common in the siltstones.

QUARTZOSE SANDSTONE FACIES

The quartzose sandstone facies is the most common facies in outcrop in the area as it is the most indurated and most resistant to weathering and erosion. In outcrop they tend to form small hills commonly low on the valley flanks and weather to whitish red and pale brown.

Angular quartz grains make up over 90% of the rock with grain sizes varying from fine to very coarse but most commonly medium grained and well sorted. A well sorted, very coarse grained sandstone occurs in two distinct outcrops south-west of Benham.

The sandstones are very porous and are generally moderately hard to hard with occasional very hard bands almost quartzitic, containing secondary quartz. They contain up to 10% of varying proportions of mica, feldspar, rock fragments and carbonaceous flecks. Fragments up to 1cm across of the mudstone facies are scattered throughout the sandstones.

The quartzose sandstone facies generally occurs towards the

base of the Triassic but also occurs interbedded with all the other facies.

JURASSIC DOLERITE

The dolerite is uniform and consists of plagioclase, augite, hypersthene, quartz and chlorite, minor biotite and iron oxide. It is extensive in the area and forms the high plateau area due to its resistance to erosion and weathering.

The dolerite is considered to be an intrusive igneous body and appears to have intruded the upper horizons of the Permo-Triassic sequence. The intrusions appear to occur as a sill or transgressive sill structure in this region.

The elevation of the dolerite is varied in the area, being 200m. above sea level in areas west of the Castle Carey Fault and up to 1000m. above sea level in the Snow Hill area south west of Royal George.

Detailed interpretations of the structure of the base of the dolerite are difficult to make due to masking by dolerite scree of the contact of the dolerite and Triassic sediments. Distinguishing between dolerite scree and outcrop can be very difficult as dolerite scree boulders can be several metres across.

However, valid interpretations can be made on a regional scale.

West of ^{the} Castle Carey Fault the elevation of the base of the dolerite is commonly between 200m.-300m. above sea level and to

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a lesser extent up to 500m. adjacent to the Castle Carey Fault and isolated areas south west of Avoca.

East of the Castle Carey Fault the elevation of the base of the dolerite is commonly between 600-700m. above sea level and to a lesser extent as low as 300m. above sea level in the Lewis Hill Homestead area.

If the dolerite has intruded the Triassic sediments at a similar horizon throughout the area to that horizon in the Stanhope area and Tertiary block faulting is the main influence on the elevation of the base of the dolerite then a similar coal measure section as observed at Stanhope could be expected elsewhere.

The nature of the dolerite intrusion also influences the elevation of the base of the dolerite. If the intrusion is of a transgressive sill nature rather than a simple sill intruding at a constant horizon then the upper horizons of the Triassic sequence will not consistently occur beneath dolerite.

Providing the transgressive aspect of the dolerite sill is not too marked, areas of low relief are likely to contain complete or incomplete coal measure sections low on the Valley flanks and possibly beneath the Valley floors. Areas where this is likely are the Valley of Marsh Creek, Bonneys Plains, South Esk Valley, north east of Campbell Town and Lewis Hill area.

CAINOZOIC

Detailed differentiation of the Cainozoic was not carried out

in the mapping. However, obvious areas of Tertiary basalt and dolerite talus are outlined.

TERTIARY

Tertiary sediments and basalts are confined to the South Esk Valley, parts of the St. Pauls Valley and to the west in the Launceston Basin.

The sediments beneath the basalt are essentially white, grey and vari-coloured mudstones, and can be observed in road cuttings along the Conara Junction-Avooca road and in the banks of the South Esk River.

An excellent section exposing the Tertiary mudstones and overlying basalt exists on the southern bank of the South Esk River, south east of Brambletye. In this section the white mudstone sequence is terminated by an iron concretion layer approximately 1m. thick, which is overlain by a moderately hard light grey vesicular basalt. The vesicular basalt is overlain by a much more indurated basalt which weathers similarly to the Jurassic dolerite. Scree of this well indurated basalt can be observed along the plains adjacent to the South Esk and St. Pauls Rivers.

Sediments overlying the basalt in places tend to be more variable consisting of mudstones, sands and gravels. Some of these sediments may be younger than Tertiary.

The overall thickness of the Tertiary section appears to be

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the order of 40m, with the basalts reaching a thickness of 25m.

The source of the basalt is most likely to be from the Tertiary Launceston Basin to the west.

Strong lineations can be seen on the aerial photographs in the areas of dolerite outcrop, some of these correspond to major faults and some possibly to major joints.

Several faults trending approximately NNW and downthrown to the east are present west of the Castle Carey Fault. This step faulting and tilting consistently downthrown to the east has also been observed to the west in the Tertiary Launceston Basin (Longman, Leaman 1971). Longman and Leaman considered these Tertiary faults to be rejuvenated Jurassic or older structures.

The step faulting and tilting is represented well in the area south of Eastbourne where three significant faults have been mapped with throws the order of 100m, to the east.

Several minor faults which caused problems in the underground mining operations around Stanhope are probably closely related to the Castle Carey Fault and could be expected to be less numerous further west from the fault.

QUATERNARY

Quaternary sediments are widespread in the area and consist of dolerite talus on the plateau slopes and valley flanks, alluvium on the plains areas in association with the rivers and creeks, and swampy loam on the valley floors.

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The dolerite talus can be up to 10m. thick with boulders up to 2m. across.

Lower levels of the talus horizon contain smaller dolerite fragments and higher proportions of muddy matrix probably as a result of greater weathering and fragmentation.

Sections of dolerite scree can be observed in land slumps which are common on cleared slopes.

The alluvium is up to 2m. thick and contains pebbles, and cobbles of surrounding country rocks usually set in a sandy muddy matrix. Sections of the alluvium can be seen in most of the creeks and rivers which have incised into the plains.

The black swampy loams form a thin soil cover up to 2m. thick on the valley floors. Sections of the loam can also be observed in the incised creeks and rivers where loam rests on top of the alluvium in places.

STRUCTURE

The Permo-Triassic sequence in the area is essentially flat lying with dips generally less than 5° . Regionally the sequence is dipping to the south west at about 4° in the area west of the Castle Carey Fault, however, several local variations do occur. Dips of greater than 5° do occur but are in close proximity to faults and are local in extent.

No folding has been discovered in the Permo-Triassic sequence

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and any variation in attitude of the beds is considered to be a result of tilting and faulting.

Faulting is very common in the Permo-Triassic sediments and Jurassic dolerite in Tasmania. Major faulting in the Avoca area is associated with the intrusion of the Jurassic dolerite and early Tertiary block movements. Minor movements during the Upper Tertiary or Quaternary rejuvenated the drainage patterns (Blisset 1959).

The Castle Carey Fault trending NNW is the most significant fault in the area and is downthrown approximately 500m. to the south-west. The most movement along the Castle Carey Fault appears to have occurred during the early Tertiary time resulting in the erosion of most of the Permo-Triassic sequence north east of the fault and exposing pre-Permian basement rock during the Tertiary.

CONCLUSIONS AND RECOMMENDATIONS

Triassic coal measures have been proven by surface mapping to be extensive within the exploration licence. Coal analysis has indicated some of the coal to possess coking properties.

Block faulting during Tertiary time along existing structural trends has brought the coal measures lower in relief and enhanced their existence beneath the valley floors especially west of the Castle Carey Fault.

If similar coal measure sequences to those which exist in the Stanhope area can be proven in areas of lower relief, then large

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tonnages of coal could exist and be readily accessible in the lower broader valleys.

Drilling is recommended initially north west of Avoca in the Bonneys Plains and Marsh Creek area to try and establish the existence of coal along the valley margins.

If favourable results are obtained from the initial drilling program then further drilling is recommended in areas south and south-west of Avoca, north-east of Campbell Town and south of Lewis Hill Homestead.

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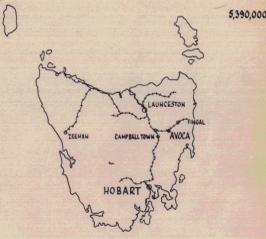
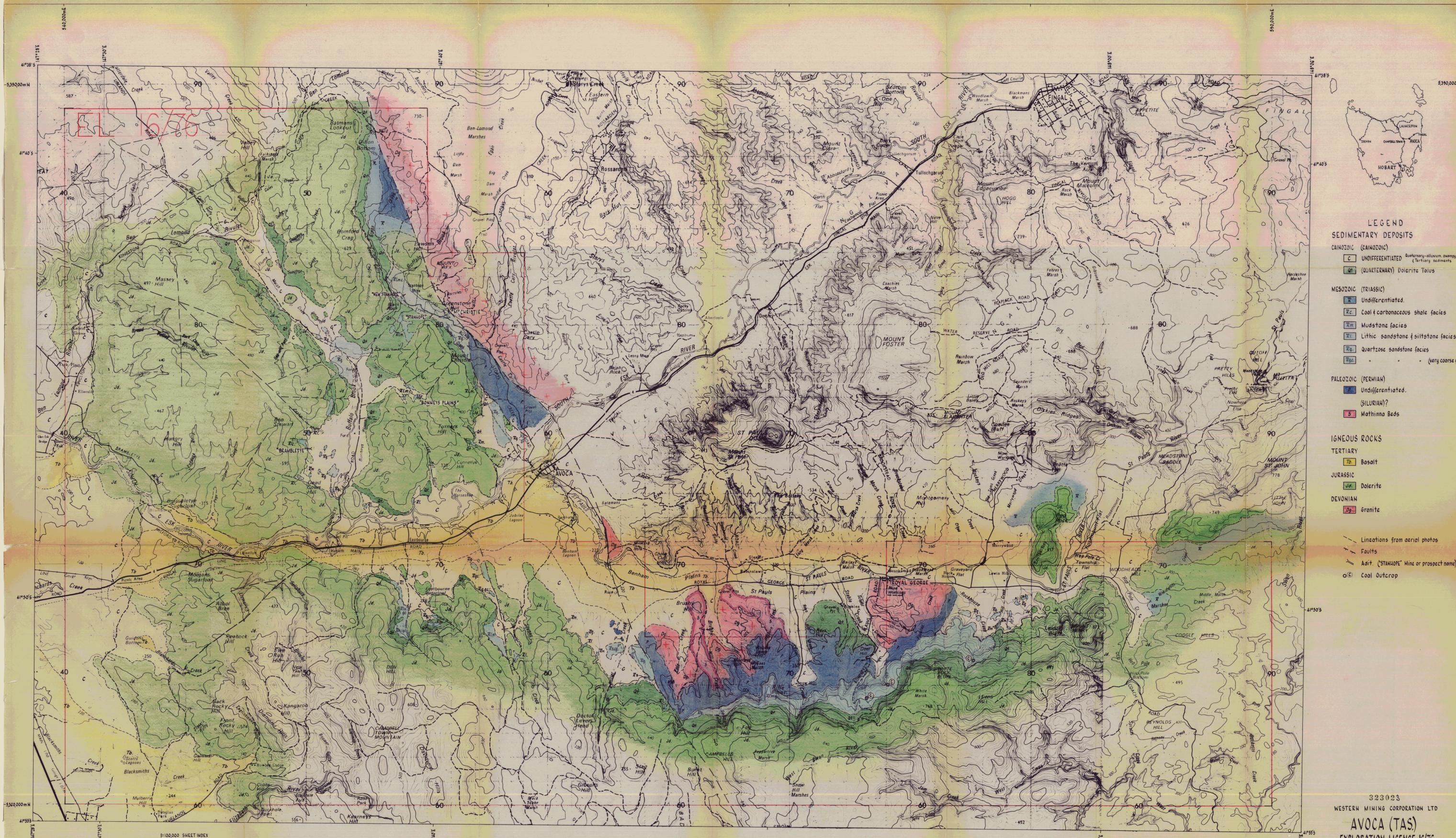
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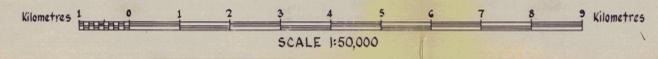
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- LEGEND**
- SEDIMENTARY DEPOSITS**
- CENOZOIC (CAINOZOIC)**
- C Undifferentiated (Quaternary-alluvium, swamp loam, Tertiary sediments)
 - Q (QUATERNARY) Dolerite Tails
- MESOZOIC (TRIASSIC)**
- R Undifferentiated
 - Rc Coal & carbonaceous shale facies
 - Rm Mudstone facies
 - Rl Litic sandstone & siltstone facies
 - Rq Quartzose sandstone facies (very coarse grain)
- PALEOZOIC (PERMIAN)**
- U Undifferentiated
 - (SILURIAN?)
 - S Mathinna Beds
- IGNEOUS ROCKS**
- TERTIARY**
- Tb Basalt
- JURASSIC**
- Jd Dolerite
- DEVONIAN**
- Dg Granite
- Linciations from aerial photos
- - - Faults
- - - Adit (STANHOPE Mine or prospect name)
- o Coal Outcrop

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