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LYELL E.Z. EXPLORATIONS

Queenstown

Report on

**GEOLOGY OF  
MOORES VALLEY**

MICROFILMED

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*Geology of Moore's Valley*

*June '59*

*NSF.*

Report No. G 77

June '59

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To: Mr. G.F. Hudspeth

1. REPORT ON THE GEOLOGY OF MOORE'S VALLEY

- 1. Dates of Examination: 9th December - 25th March.
- 2. Man days in the Field: 25 (on geology)

Personnel:

- Geologist: P. Rodda
- Students: R. Hewitt  
K. Fletcher
- Bushmen: H. Hurd  
R. Martin  
M. Simms

- 3. Location of Camp: Three camps were used; the first established, and main camp, was at 44N/15E on the Moore's Valley grid (see Plate P82). The other two, at 28N/5E and 40aN/14W, were only used part of the time. All coordinates in this report are based on the grid with baseline at 027° magnetic, and lines at 117°.
- 4. Means of Transport & Supply: By helicopter based at Birch.

5. General Topography of the Area

Moore's Valley is about three miles wide between Tabletop (original name of Hazell Hill) and the Owen Conglomerate south of Thirkell Hill. From a distance the general impression is that the valley slopes gently northwards, after a fairly steep drop of about 200 feet from the level of Tabletop, until the Colin River is reached, at the north side. In reality, however, this slope is quite dissected with an extensive, typically dendritic, drainage pattern. Many streams are in deep, steep-sided gullies with thick bush.

The Wanderer River flows through a deep valley in the Owen Conglomerate on Tabletop, then along the SW-NE striking Wanderer Fault. Though not strictly in the Moore's Valley area, two visits were made to the area around airborne geophysical anomaly 20/8, to get some idea of the geology immediately to the west of the Lyell Shear there.

6. Geology

A. Tertiary Sediments: Macquarie Group

Tertiary sediments fill the graben between Thirkell Hill and Tabletop. It is difficult to obtain a stratigraphic column through them, due to the great lateral variation of facies. Beds several feet thick can lens out in a distance of tens of feet, or may have been eroded during deposition in places. Columns can be obtained in some of the large gullies where the sides

are vertical and the sediments are exposed; correlating from side to side up the gully (this is generally possible), a column may be built up. Correlation between columns obtained in places separated by half a mile or more is extremely difficult and uncertain, though by breaking the columns up into very general units it can be done in some cases.

(a) Discussion of Sequences (Plate P83)

Three sequences were obtained, but cannot be correlated. Assuming a regional dip to the north of only  $5^{\circ}$ , the three occur in different parts of the stratigraphic column. The dip is higher than this in general, over  $10^{\circ}$  in places.

Sequence I was obtained well off the grid, at approximate coordinates 16N/50E. It includes a clay bed 6 feet thick - the thickest seen anywhere here. Clay does occur frequently, usually as matrix in gravels, and as small lenses up to 1 foot thick, though lenses of 2-3 feet are also found. This thick bed contains leaves, remains of wood, etc. (LE1802). The rest of the sequence is mainly gravel, with pebbles generally smaller than 6", at the base, with the upper part of the sequence mostly sand, grit and fine gravel, with the two clay beds.

Sequence II, taken on and south of the 32N line, contains mainly gravel and sandy gravel, with a few sand beds, the thickest being at least 5 feet. The pebbles in the gravel are mostly small, up to about 3" in diameter. One bed, 10 feet thick, contains pebbles up to 6-9" in diameter. One cycle of sedimentation appears to exist, from 6 feet above the base of the sequence, to somewhere in the gap.

Sequence III (see Plate Q22, sheet 1) is the most interesting. The lower 60 feet is the usual quartzose type of sediment, and is predominantly sand, grit and fine gravel. The beds with many pebbles greater than about 2" have a total thickness of 9 feet, with a further 6 feet perhaps falling in this category. Above the gap in the sequence, the thickness of which is uncertain due to uncertain dip of the sediments, there are many beds of sand, grit and gravel with abundant Dundas pebbles and detritus. The Dundas material has about the same size ranges as the quartzose material.

Throughout the sequence as a whole, there is an alternation of sand and grit with gravel. Several cycles can be recognised, each starting with deposition of a gravel. The grain size of succeeding beds roughly decreases, until the cycle ends with clay, sand, or even just an unsorted sand with pebbles.

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A good example is the cycle from 115 to 67 feet below the top of the sequence. It begins with 2 feet of unsorted gravel with pebbles up to 6" in diameter. The next bed is 15 feet thick, gravel with thin sand bands and boulders up to 1 foot in diameter though the usual size is up to about 3". The final bed is 22 feet of sand containing bands of pebbles up to 1/4" or occasionally larger.

(b) Thickness of Sequences

Taking the total of the three sequences, a minimum stratigraphic thickness of 425 feet is obtained. The top was not reached, an unknown thickness of sediments having been eroded from above Sequence III, and the base is an unknown distance below Sequence I. Also, the gaps between the sequences cannot be properly ascertained due to uncertainty about the regional dip. Faulting of at least a small scale is known, so quite possibly there are further small faults, perhaps large ones.

Due to the regional dip, and unknown contours of the surface on which the Tertiaries were laid, the stratigraphic thickness is not the effective thickness of sediments remaining in Moore's Valley. It must be remembered that the sequences were measured above the valley floors in each case, so that in the vicinity of sequence II, for instance, the minimum thickness of Tertiaries under the valley floor is at least 75 feet. However, small rises or even hills on the bedrock surface may rise to within a relatively short distance of the present surface. A seismic refraction survey would be able to clear this problem up.

(c) Composition of the Tertiaries

Throughout most of the Tertiaries, quartz is the predominating mineral; quartz, quartzites of many colours, and siliceous conglomerates make up the majority of pebbles and boulders. The quartzites and conglomerates are both Precambrian and Ordovician. Other pebbles found are of a friable quartzite, probably originally containing feldspar; mica and sericite schists, mudstone and what appears to be weathered porphyry. Balls of clay and mud are fairly common.

Near the base of the sequence, beds have been found which are almost wholly composed of Dundas pebbles and detritus. The positions on the grid of exposures are near 28S/10E and near 4S/5E, though the position of the latter in the sequence is unknown. At the former locality, the beds are exposed in the bank of a stream (see Fig. 1); 50 feet upstream, 22 feet higher, is an outcrop of Owen Conglomerate, sandstone facies, indicating that the Dundas-rich beds are very near the base of the Tertiaries at that spot. Above these beds there are boulders of Owen sandstone and conglomerate, up to a foot in diameter, in gravels.

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The formation of a bed almost wholly Dundas material, so near to Owen Conglomerate, and relatively far from any Dundas, is interesting and puzzling. South of this stream, the Owen Conglomerate surface rises at an average slope of  $27^\circ$  along the line, taken over a slope distance of 700 feet.

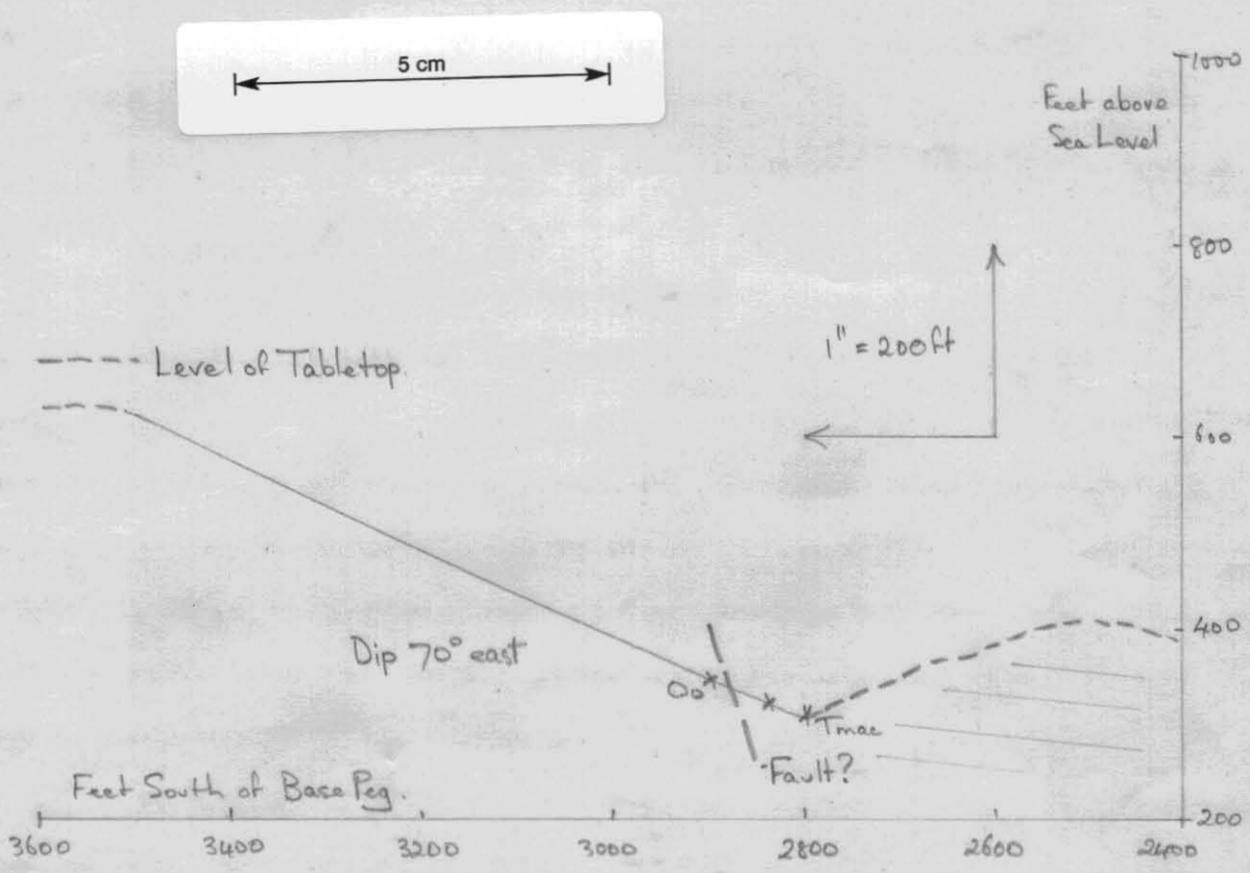


Fig. 1. Section along South End of IOE. Line

In sequence III, the thickest one measured, a bed of gravel 12 feet thick is at least 50% Dundas pebbles and detritus. Higher in the sequence similar beds occur but with less Dundas. The material is present in sizes up to 1 foot in diameter, and in the same size range as the quartzose material.

No marine fossils have been found, but in some horizons plant remains, leaves and wood, are present and in some cases common. These are up to bituminous coal in rank. Specimens have been submitted to the University of Tasmania for palynological analysis and dating. They occur at two horizons in Sequence I, 383-4 feet, and 396-402 feet above the base; also in the bed of the Wanderer River about coordinates 3-4S/30W. This latter locality is most likely on the western side of the Wanderer Fault, though there is a possibility that the sand was deposited in a hollow in the old Dundas land surface. Dundas outcrops in the river bed not many chains upstream.

Different matrices may be found in the sediments. Usually the gravels have a matrix of sand with lesser amounts of particles down to clay size.

Sometimes however, the matrix is mainly clay, with very few sand-sized particles.

A representative selection of detrital minerals from the Tertiaries was obtained by panning a small creek near the main camp. Quartz, of course, predominates, some of it smoky, with muscovite also common. Biotite occurs but is infrequent. Rutile and hematite occur in reasonable quantities in the creek, having been concentrated there. Gold is rare, about 7 colours having been found in more than twice that number of pannings. Topaz and zircon also occur. An interesting mineral is kyanite, both blue and white. The origin of this is unknown. Magnetite and chromite are absent.

Concretionary structures are widespread and indeed common in some places. Normal types of concretions of all shapes from spherical to cylindrical, or irregular, occur in certain horizons. Some beds are rich in iron, and have been cemented. Usually it is sand, but cemented gravel has been found (LE397). A hard band of sand occurs just south of the main camp, and can be traced for about 500 feet. Where it crosses gullies it forms small waterfalls. The outcrop of this bed can be traced on the air photos, about the only case of any sort of photo-interpretation in the Tertiaries.

An outcrop of bog iron ore occurs near 72N/00 (LE398). This has been assayed as No. S41 and contains 51% Fe. and 2.5% S.

Also noted, especially in Sequence III, are thin bands, usually up to  $\frac{1}{4}$ " , but sometimes over 1" thick, which have been cemented. Their composition varies - it may be very fine-grained and iron rich, or merely cemented sand. They are usually found in sand, but occasionally in gravel beds. These bands are abundant throughout the part of the sequence rich in Cambrian material. They are often parallel to the bedding, or may cut it at an angle, or form wonderfully contorted bands. One set of hard bands seen formed a filigree pattern of curved lines.

Formation took place after deposition of the sediments and the process of cementation is probably still going on. On the face of one exposure, water trickling down has formed a thin hard casing, rich in iron, over a soft clay and sand.

(d) Faulting in the Tertiaries

Two faults were found in the Tertiary sediments. It could not be ascertained whether they are in fact true faults, or merely slips due to differential compaction. The first, at grid coordinates 33N/35E, strikes E-W

and is downthrown to the south, throwing gravel against sand. The second, near 52N/7W, has approximately the same strike but is downthrown to the north. On neither could the throw be determined, but it is at least 5 feet and 9 feet respectively. It is assumed that they are normal "faults", due to the undisturbed nature of the sediments. In one sand bed in Sequence III, there is a small compaction slip with a six inch downthrow to the northwest. It only affected about two feet, fading out in each direction vertically.

B. Owen Conglomerate and Dundas Group

On the south side of Moore's Valley, the grid passes from the Tertiaries to the rocks of Tabletop. There are three rock types in the area studied. Towards the axis of the Osmond Syncline, a white, highly siliceous conglomerate (Owen Conglomerate) occurs, though near 28S/10E an outcrop of fine quartzite was found. Further west, on and near the baseline, a micaceous white quartzite (Owen Conglomerate, LE1808) and a red mudstone (Dundas Group?, LE1807) were found. Though they occur to the west of the syncline, they dip rather steeply to the west, due no doubt to the branch of the Lyell Shear which passes to the east of them. The mudstone is tentatively placed in the Dundas Group at this stage, awaiting clarification of the term Owen Conglomerate.

The southern boundary fault of Moore's Valley (or one of them), runs along the edge of the Tertiaries just to the north of Tabletop. It was originally placed there during photo-interpretation of the area, but moved north because of possible correlation with airborne magnetic results.\* The original position has now been confirmed by work carried out with Induced Polarisation by the McPhar personnel.

7. Summary

Apart from small areas of Owen Conglomerate and ?Dundas Group on the southern end, the Moore's Valley grid is solely on Tertiary sediments. These fill the graben to an unknown depth. Three sequences were measured (plates P82, P83 and Q22 sheet 1). A regional dip to the north of 5-10° exists, which means that the three are in different parts of the stratigraphic column, providing no extensive faulting has gone on. The minimum stratigraphic thickness of sediment originally filling the valley is 425 feet. The effective thickness remaining under the floors of valleys and gullies is less, though, and depends on the regional dip of the Tertiaries and the contours of the surface on which they were deposited, and of course on the depth of erosion.

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\* H.S. Hancock: Report GP15, 8th October, 1958 - pages 28-31

Sequence III, the thickest measured, shows 7 cycles of sedimentation, or parts thereof, generally starting with unsorted gravel, and finishing with sand or clay. Cycles are more difficult to recognise in the other two sequences, but one appears to exist from 6 feet above the base of Sequence II to somewhere in the gap in the sequence.

Sequences I and II consist almost wholly of the usual quartzose material from the Precambrian and Owen Conglomerate, with occasional pebbles of Dundas, or chloritic schist. However, in most of Sequence III, Dundas material is common, and one bed contains at least 50% Dundas pebbles and detritus. Bands of iron-rich cemented sand are common in parts of the sequence, generally being up to  $\frac{1}{4}$ " thick. They usually bear no relation to the bedding.

No marine fossils have been found, but at several places sand and clay occur, containing plant remains.

Concretions are common in certain horizons. They are usually cemented sand with a soft, finer centre. Bog iron ore occurs in several places, notably near 72W/00 (LE396). A specimen was assayed and found to contain 51% Fe and 2.5% S.

Two faults of unknown throw were found in the Tertiaries, but it is not apparent whether they are true faults or merely slips due to differential compaction.

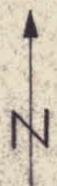
Owen Conglomerate occurs on the southern part of the grid, both as conglomerate and quartzite. A red mudstone (LE1807) occurs on the baseline and is provisionally placed in the Dundas at this stage, solely on lithological grounds.

*Peter Rodda.*

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Area referred to in report

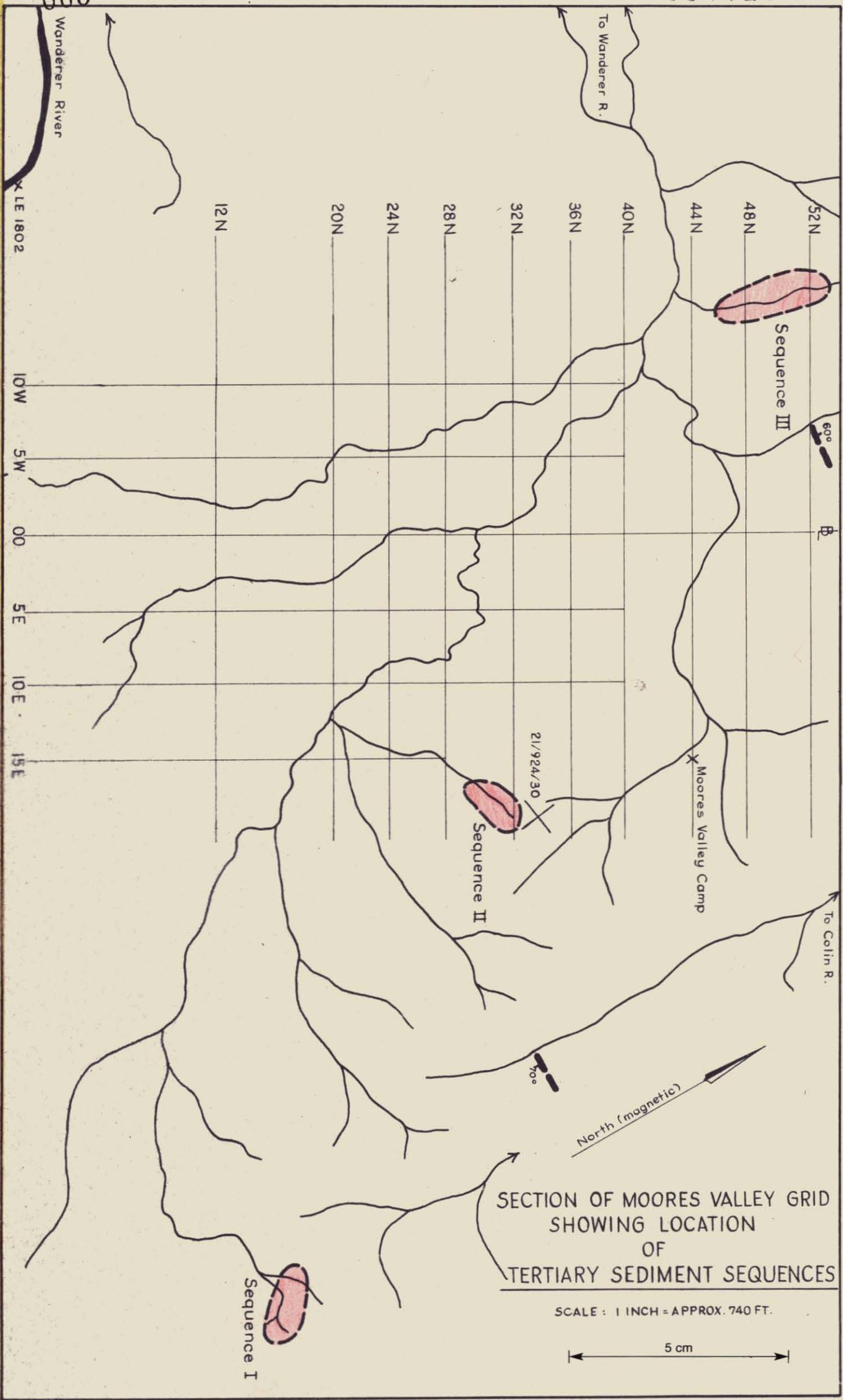


**SOUTH-WEST TASMANIA**

Scale: 8 miles to 1 inch

5 cm

AMG REFERENCE POINTS ADDED



SECTION OF MOORES VALLEY GRID  
 SHOWING LOCATION  
 OF  
 TERTIARY SEDIMENT SEQUENCES

SCALE : 1 INCH = APPROX. 740 FT.

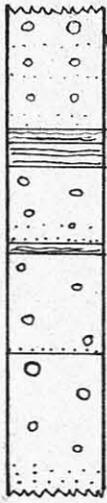
5 cm

009

358011

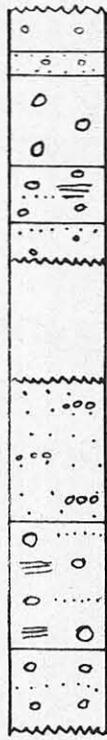
Feet above S.L. 415'

Sequence I



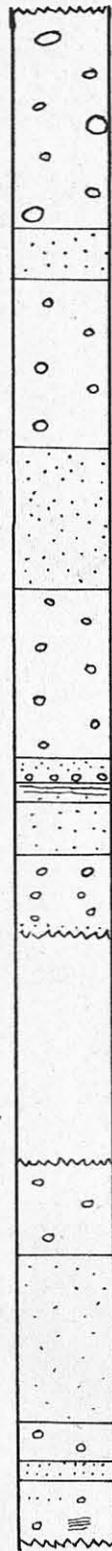
345'

Sequence II



258'

Sequence III



400'

370'

340'

310'

280'

250'

Gap of about 30' 40'.

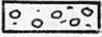
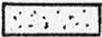
190'

160'

135'

130'

LEGEND

-  Gravel.
-  Sand.
-  Clay.

5 cm

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TWO SECTIONS OF TERTIARY SEDIMENTS.

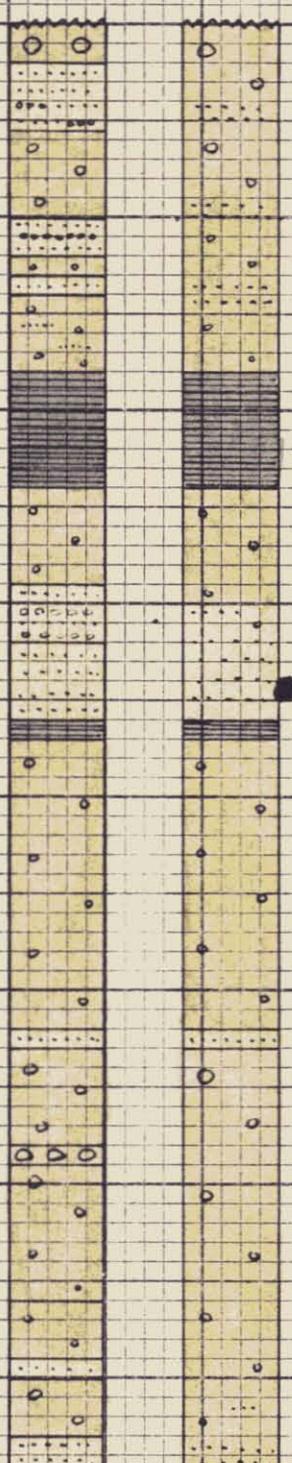
MOORE'S VALLEY.

Section III.

370 ft above sea level.

Section I.

420' above sea level.

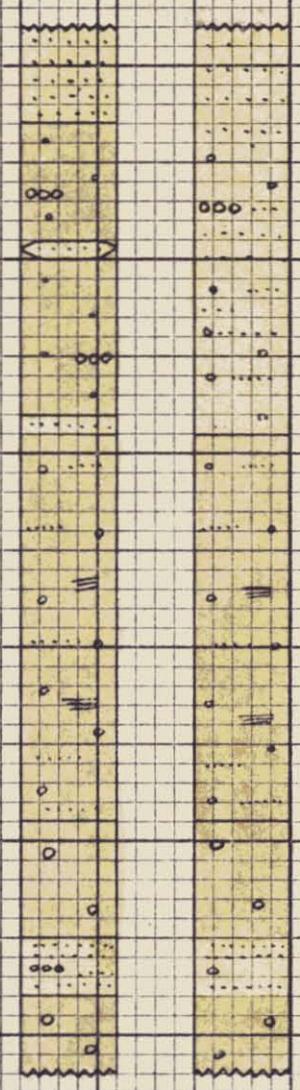


345' above sea level

Simplified Section

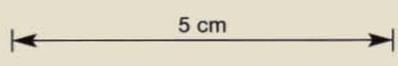
Legend.

-  Gravel.
-  Coarse to fine.
-  Sand.
-  Clay.



298' above sea level.  
Simplified Section

Vertical Scale: 1 inch = 10 feet





- Gravel, size of circles gives approx. idea of pebble size.
- Grit, very fine gravel.
- Sand.
- Clay.

Location of Sequence.  
46-56N, 12-18W.



GEOLOGY

MOORES VALLEY

TERTIARY SEDIMENTS      SEQUENCE III

P.R.	Apr.'59	Vert.	Q22 1
		10 ft.	
		to	
P.R.	Apr.'59	1 inch.	
B.K.D.	May'59		011

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