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Plan No.1149.

Notes on
Structural Features of Granite at
Balladonia Station.

By

H.B. Owen, Geologist.

17th November, 1944.

CANBERRA.

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DEPARTMENT OF SUPPLY & SHIPPING.
MINERAL RESOURCES SURVEY BRANCH.

NOTES ON STRUCTURAL FEATURES OF GRANITE AT BALLADONIA STATION.

Eucla Division, Western Australia.

Report No. 1944/43 - Plan No. 1149.

Balladonia is a sheep station homestead and was formerly a telegraph station. It is 136 miles by road east from Norseman and the station buildings are grouped about the edges of an outcrop of granite surrounded by Tertiary limestone. The granite lies in a shallow depression and a number of pools of water are held on its impervious surface. The capacity of some of these natural rockholes has been augmented by the erection of earth banks.

The granite is coarse in grain, and to casual observation massive, but some peculiarities of texture suggestive of flow structures were noticed.

Examination of the rock in hand specimens shows that it is reddish in colour and composed of large crystals of orthoclase set in a matrix of smaller crystals of felspar and clear quartz. A little biotite, occurring as very small flakes, and grains of magnetite can be seen, but any other constituents which may be present are not apparent in the hand specimen.

It was decided to map the outcrop as well as time and circumstances would permit, paying special attention to any primary structure that could be observed.

The mapping was carried out by compass intersections from a measured base line augmented by pacing and sketching to fill in smaller details. The attached sketch map on a scale of 1 inch equals 400 feet is the result and the following notes are explanatory.

The area of outcrop, which was mapped by compass, is elliptical in plan and measures about 2,400 feet by 1,600 feet with the long axis trending northeast. At the northeast end of the exposure the boundary was not closed, but it is not likely that granite extends much further in this direction.

While mapping features within the boundaries of the granite mass, it was discovered that the rock is highly magnetic, so much so that it was necessary to avoid making compass readings nearer than a few feet from large boulders. Crystals of magnetite were found in some of the narrow pegmatite veins and it was also observed that the aplite dykes contain very localised highly magnetic zones, which, however, cannot be detected by eye as differing in any respect from non-magnetic parts of the same aplite dyke.

Variometer traverses in the vicinity of the magnetic station, which is on limestone west of the telegraph building, showed disturbed magnetic conditions, indicative of magnetic rock at shallow depth.

Two sets of joints, striking north and east respectively are well developed, and a system of jointing striking about east-southeast is also present. Aplite dykes are not confined to any one system, but occur in all three. Very narrow aplite veins striking north are common. Four narrow pegmatites were noticed, three of them belonging to the east-southeast system and the other strikes north. The pegmatite is rich in orthoclase (or microcline) and locally contains some magnetite in crystals up to half inch across. One aplite vein strikes northeast and is intersected by a north-south joint which on the east side has displaced the vein several inches to the south. All the joints described are vertical or very steeply inclined.

Extensive weathering on many of the joints belonging to the north-south and east-west systems has divided the outcrop into a number of tors, roughly rectangular in plan, separated by narrow "alleyways" between vertical or steep walls. This feature is well

shown on the plan near the centre of the granite, and on a smaller scale at 400' north from the northeast corner of the Telegraph Station wall.

Parallel orientation of felspar crystals is very marked near the centre of the mass, and less readily apparent, but still distinct, at other places. The trend of this parallelism ranges between 45° and 75°, with 60° being the most common strike observed.

Flow layers, characterised by lighter colour than the normal granite, and having a slightly different mineral composition, were also noticed. These layers have well-defined boundaries and the dip and trend may be measured as with stratified rocks. The trend and dip of the flow layers are not constant and considerable folding on a small scale is evidenced by wide variations within a small area inside the northeast corner of the stone wall. The trend of the flow layers is not exactly parallel to that of the orientation of the felspar crystals, but the approximation is fairly close.

The hurried examination of one small outcrop of granite does not yield sufficient data on which to base reliable or even probable conclusions regarding the direction of flow of the intrusive or the shape of the chamber into which the magma was injected. It was hoped that an opportunity might arise to visit other granite outcrops with a few miles radius when some systematic pattern of flow structures might be revealed, but only two such localities were seen. These were Wonberna, 12 miles south-southwest and Booanya, 27 miles south-southwest from Balladonia. At the former place, the rock is a fine-grained gneiss and probably represents the host rock into which the Balladonia granite was injected. At Booanya the granite is similar to that at Balladonia, but examination in the very short time available failed to reveal any primary structures. No other granite similar to that at Balladonia was seen.

So far as any conclusions may be drawn, it is very tentatively suggested that the outcrop at Balladonia shows a portion of the northwest edge of a batholith or cupola at no great distance from the wall or the roof.

In passing, it is worth noting that the contact between the ancient rock and the Tertiary limestone is not without interest. At the three localities mentioned, the granite or gneiss lies in a depression about 20 feet or more below the level of the limestone plateau and the limestone appears to dip gently away from the granite in all directions.

This gentle doming of the limestone over the basement rock is due, no doubt, to compaction of greater thicknesses of sediment where the rigid support provided by the granite is lacking.

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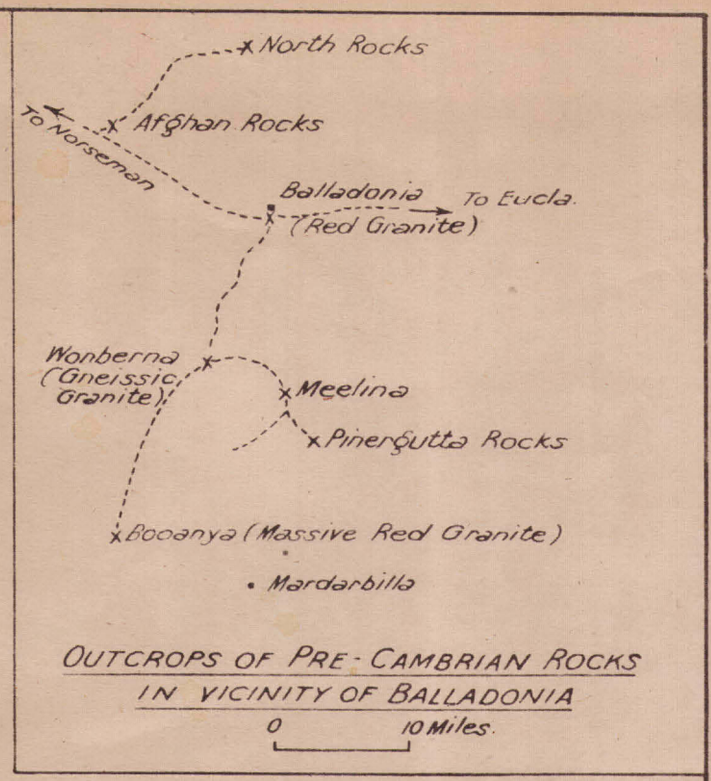
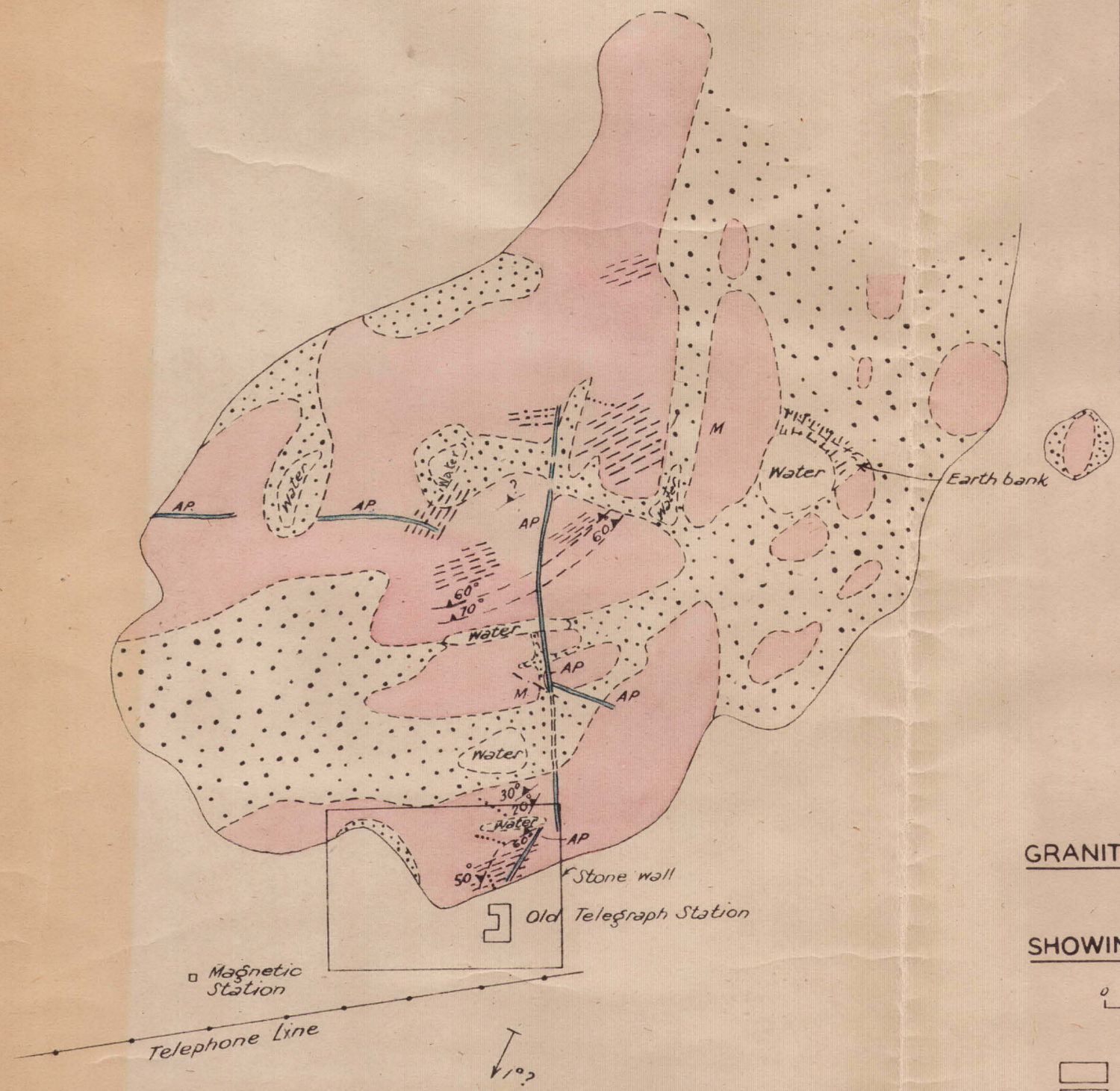


OUTCROPS OF PRE-CAMBRIAN ROCKS
IN VICINITY OF BALLADONIA

0 10 Miles.



SKETCH PLAN
GRANITE OUTCROP AT BALLADONIA,
EUCLA DIVISION, W.A.
SHOWING STRUCTURAL FEATURES

0 500 1000 ft.

Reference

- Tertiary limestone
- Granitic soil
- Granite
- Prominent joint
- Pegmatite
- AP Aplite (width much exaggerated)
- 50°y Dip & strike of Flow layer
- Trend of parallelism of Felspar crystals
- M. Massive - apparently devoid of structure

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16-11-44.

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