DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 80/104

DISCOVERY OF EARLY CRETACEOUS SEDIMENTS AT MINTABIE OPAL FIELD.

(FOR QUARTERLY GEOLOGICAL NOTE)

GEOLOGICAL SURVEY

By

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D.M.E. NO.272/78

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DEPARTMENT OF MINES AND ENERGY
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INTRODUCTION

This note records previously unrecognised Early Cretaceous sediments unconformably overlying Palaeozoic rocks at the Mintabie opal field (Fig. 1).

Following renewed mining activity at Mintabie in 1977-78, the Mineral Resources Section of the SADME carried out detailed mapping in 1979, (Townsend, in prep). As part of this investigation, opal miners were asked to report any fossil finds to the Area Officer.

FOSSIL DISCOVERY

In September 1979, Mr. Tim Webb (opal miner) found silicified mollusc shells (Plate I) at the edge of a bulldozer cut (designated cut 16) on the southeastern margin of the main area of workings (Fig. 2). During a subsequent search of dump around cut 16, another six samples of claystone containing small fragmentary mollusc fossils were found, although none were as well preserved as Webb's original sample.

In addition, silicified claystone with plant remains (Plate II) were also found and identified by W.K. Harris (then Supervising Geologist, SADME) as a rootlet system which was not diagnostic of any particular species, and could not therefore be used for age determination.

The mollusc moulds and casts were identified by Dr. N.H. Ludbrook (consultant, Department of Mines and Energy,) as Gari

forbesi (Ludbrook 1966) indicative of an Early Cretaceous (Aptian) age. These fossils clearly established the presence of Early Cretaceous, Marree Subgroup (Ludbrook 1980), sediments at Mintabie.

LITHOLOGICAL SEQUENCE IN CUT 16

A Mesozoic sandstone unit and Marree Subgroup claystone which unconformably overlie an undulating surface of Mintabie Beds, are capped by Tertiary sediments. All rocks have been subsequently silicified, to varying degrees. The sequence in the trench is depicted inPlate III and detailed below in ascending stratigraphic order.

Mintabie Beds (Ordovician to Devonian).

Predominantly cross-bedded, fine to coarse grained, well sorted, kaolinitic sandstone with some quartz sandstone and numerous thin claystone interbeds. Both large and small scale cross bedding occur in the well sorted medium to coarse grained quartz sandstone. The variable silicification increases towards the top of the Mintabie Beds, an undulating erosional surface (Plate III).

Mintabie Beds are part of a thick succession of Palaeozoic sediments deposited in the Officer Basin. Mintabie Beds overlie Cartu Beds, comprising white green and red sandstone siltstone and shale, which in turn overlie Blue Hills Sandstone, well sorted medium grained quartz sandstone. Krieg(1973) considered (?)Devonian Mintabie Beds to unconformably overlie (?)Ordovician Cartu Beds and Blue Hills Sandstone, but Cartu Beds are now believed to represent the basal portion of Mintabie Beds (Townsend in prep) and all three units are part of a conformable (?)Ordovician sequence. A broad time range has been adopted until the problem is resolved.

Mesozoic sandstone ((?)Late Jurassic to Early Cretaceous)

Overlying the erosional unconformity is a fine to medium and coarse grained, poorly sorted very kaolinitic sandstone with a few quartz and quartzite clasts up to boulder size. This sandstone, which varies from 0 to 4 m in thickness may be a fluviatile sandstone equivalent to Algebuckina Sandstone (Wopfner et al 1970) or alternatively may correlate with Cadna-owie Formation, (Wopfner et al, op cit) a sequence of sandstone and shale, transitional between Algebuckina Sandstone and the overlying marine Marree Subgroup, (Ludbrook 1980). If the Mesozoic sandstone is equivalent to Algebuckina Sandstone, it may be of Late Jurassic to Early Cretaceous age, whilst Cadna-owie Formation is of Early Cretaceous age.

Marree Subgroup (Early Cretaceous)

Marree Subgroup is a marine claystone, unit 2-3m thick, (?)unconformably overlying the Mesozoic sandstone. In the Great Artesian Basin, Marree Subgroup commonly contains several thin boulder beds near the base, but at Mintabie, only one such bed occurs, with quartzite and weathered claystone boulders set in a predominantly clay matrix. More resistant quartzite boulders, are more obvious in weathered exposure but outlines of siltstone and faint claystone boulders can be seen. The largest boulder was a 0.75 m long elliptical quartzite boulder (Plate IV) in the dump adjacent to cut 16. The claystone is variably silicified and approximately 2m above the base is a highly silicified band of claystone containing irregular coarse sand and silt lenses with evidence

of bioturbation. Fragments of similar silicified claystone found on the dump contain a thin layer of shells. Although no in situ shells were found, the mollusc shells are assumed to be associated with this silicified claystone band. In cut 16, the eroded top of Marree Subgroup is gently undulating and silicified, forming a silicified palaeosol. Marree Subgroup claystone appears to thicken towards the southern end of the trench, or right hand side of Plate III.

This claystone sequence is correlated confidently on lithological grounds with basal Marree Subgroup sediments around the margin of the Great Artesian Basin, and in particular, at Andamooka opal field (Carr et al. 1979) and at Stuart Creek opal field (Barnes et al. 1980).

Sandstone-conglomerate (Tertiary-Quaternary)

Sandstone and conglomerate with patches of red jasper breccia and red sandy to pebbly clay is developed irregularly on the eroded top of Marree Subgroup. Silcrete pebbles and patches of red jasper breccia indicate at least two phases of silicification. Iron staining, mottling and infilling by younger gibber soil has produced a mixture of lithologies. The Tertiary - Quaternary sediments vary in thickness from 0-2 m, and are distributed widely, but irregular at Mintabie.

DISTRIBUTION OF CRETACEOUS ROCKS

Detailed inspection of nearby outcrop and bulldozer trenches revealed that Cretaceous sediments are exposed only in cut 16. However, several Calweld drillholes near the southern margin of the main area of workings intersected (?)Cretaceous sandstone and claystone and

indicate a thickening southwards. Presumed extent of Cretaceous rocks near the opal field is shown on Figure 2.

Cretaceous sandstone and claystone crop out near Wallatinna, 15 km southeast of Mintabie, (see EVERARD 1:250 000 geological sheet) and (?)Mesozoic sandstone crops out sporadically 20 km southwest of Mintabie. Numerous small remnants of Late Jurassic - Early Cretaceous sediments are expected in the Mintabie area.

SUMMARY

Fossil evidence has confirmed Marree Subgroup claystone and Mesozoic sandstone overlying opal bearing Mintabie Beds on the southern margin of the Mintabie opal field. Early Cretaceous sediments are host rocks at all other major precious opal deposits in Australia and their presence at Mintabie, must increase the opal potential of this field.

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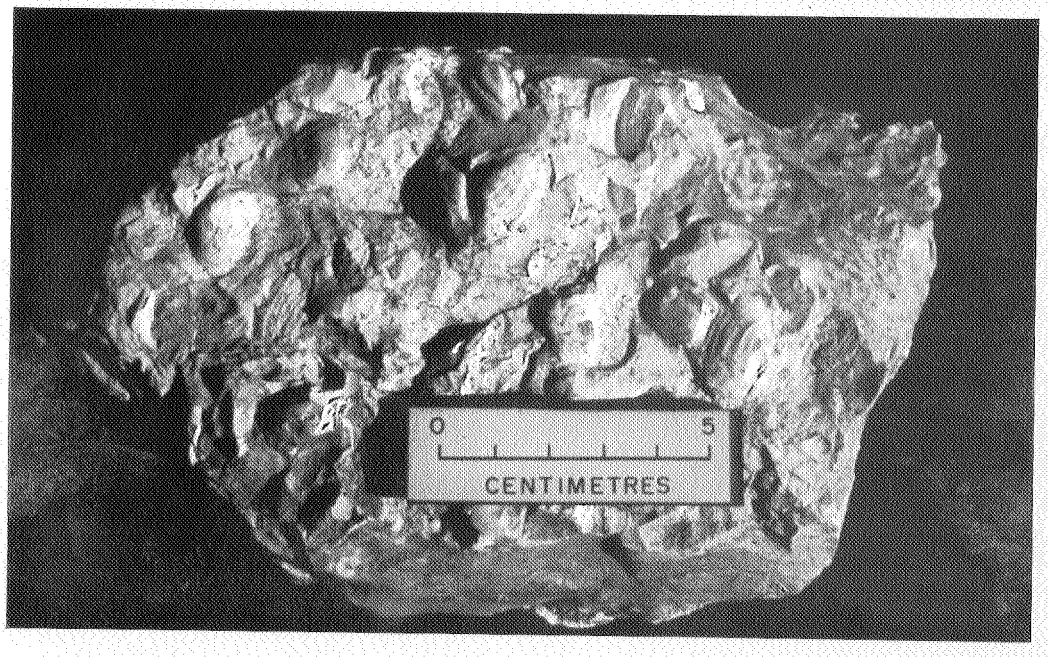

PLATE 1. Mintabie opal field:- silicified molluscs Gari forbesi (Ludbrook) in silicified basal Marree Subgroup claystone. (Slide 15660)

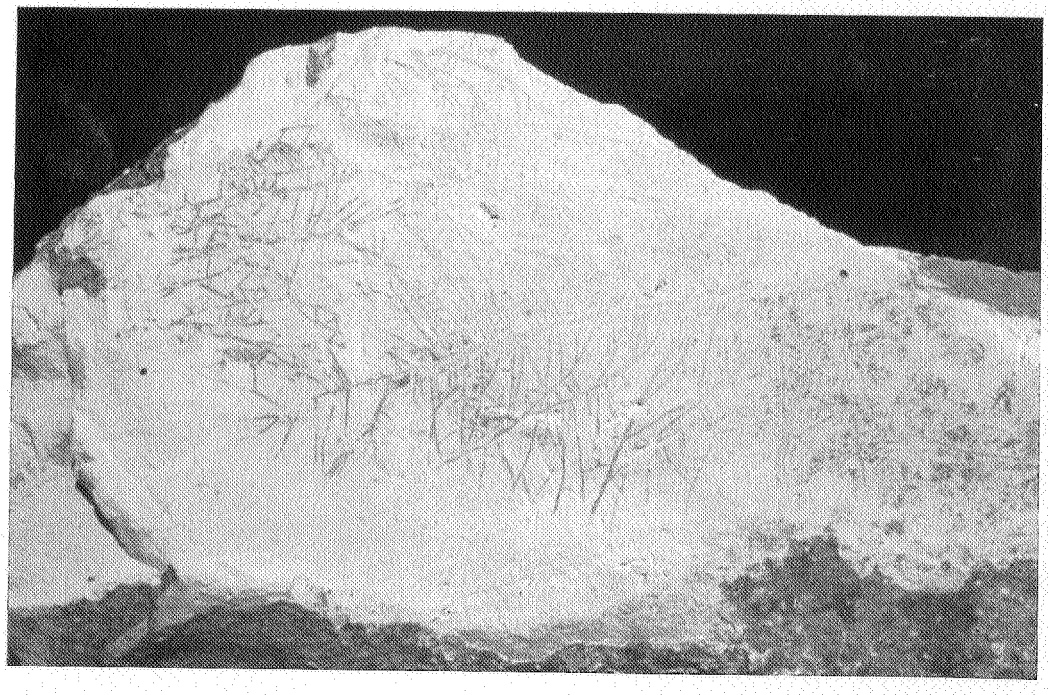

PLATE II. Mintabie opal field:- Plant ramains; rootlets preserved in partly silicified basal Marree Subgroup claystone. (slide 15661)

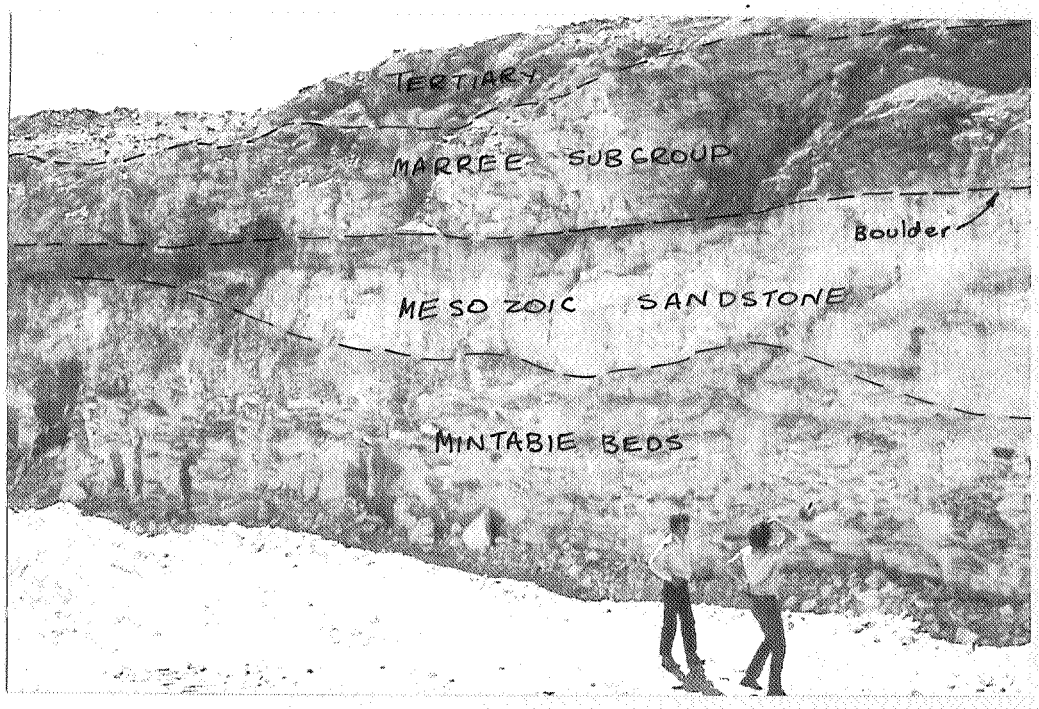

PLATE III. Mintabie opal field - eastern face of cut 16 showing Mintabie Beds overlain by white Mesozoic sandstone silicified Marree Subgroup claystone and Tertiary sandstone. The prominent band near the base of the Marree Subgroup is the boulder bed. (Slide 15662)

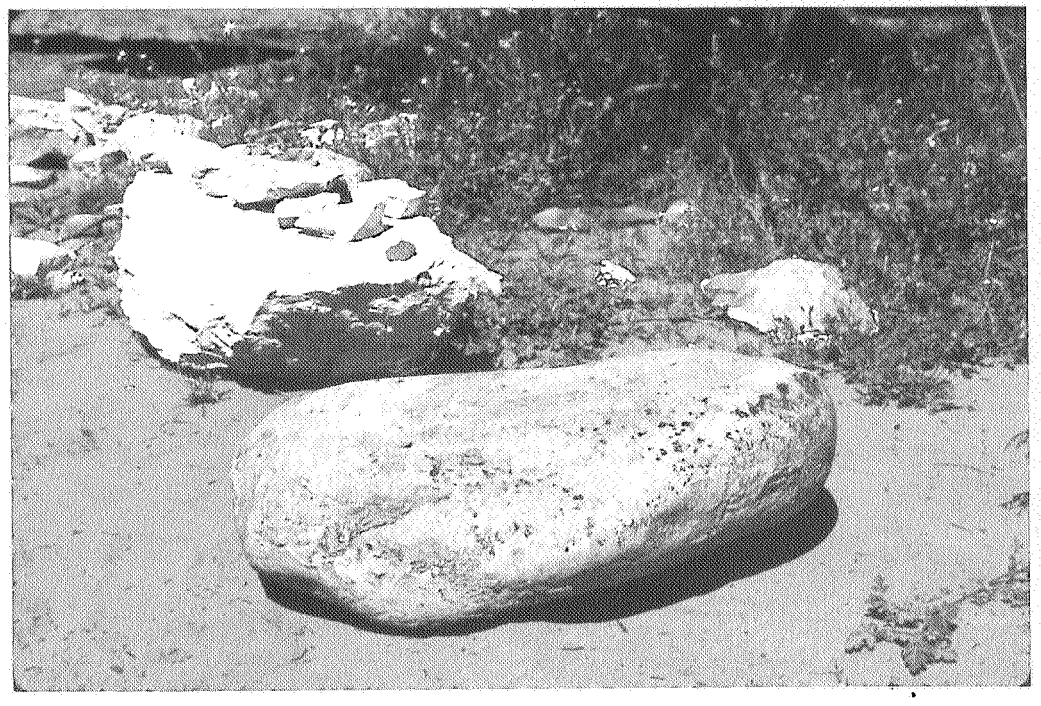

PLATE IV. Mintabie opal field:- Rounded quartzite boulder, 0.75 m in length, from boulder bed in basal Marree Subgroup. (Slide 15663)

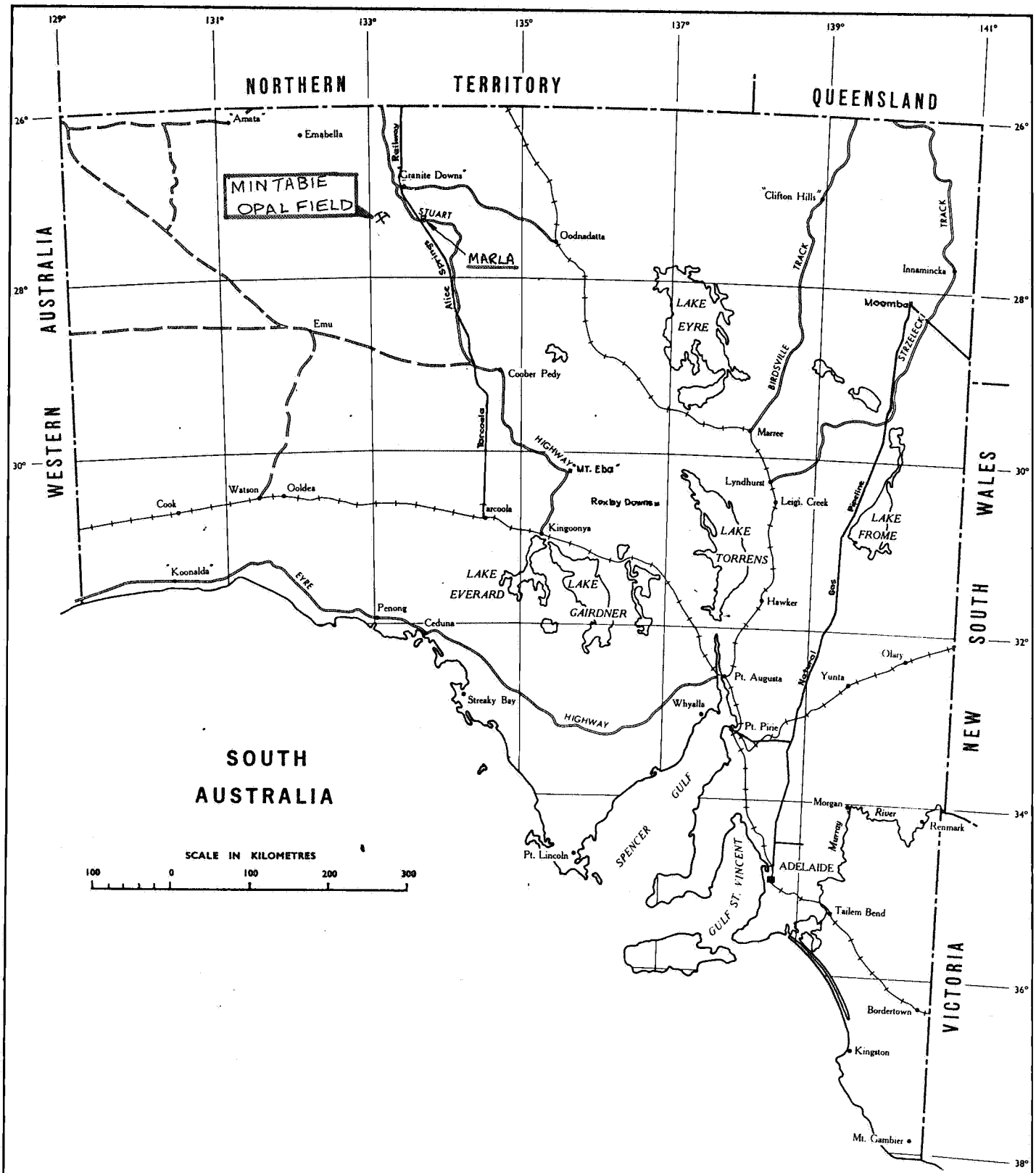

FIG. 1

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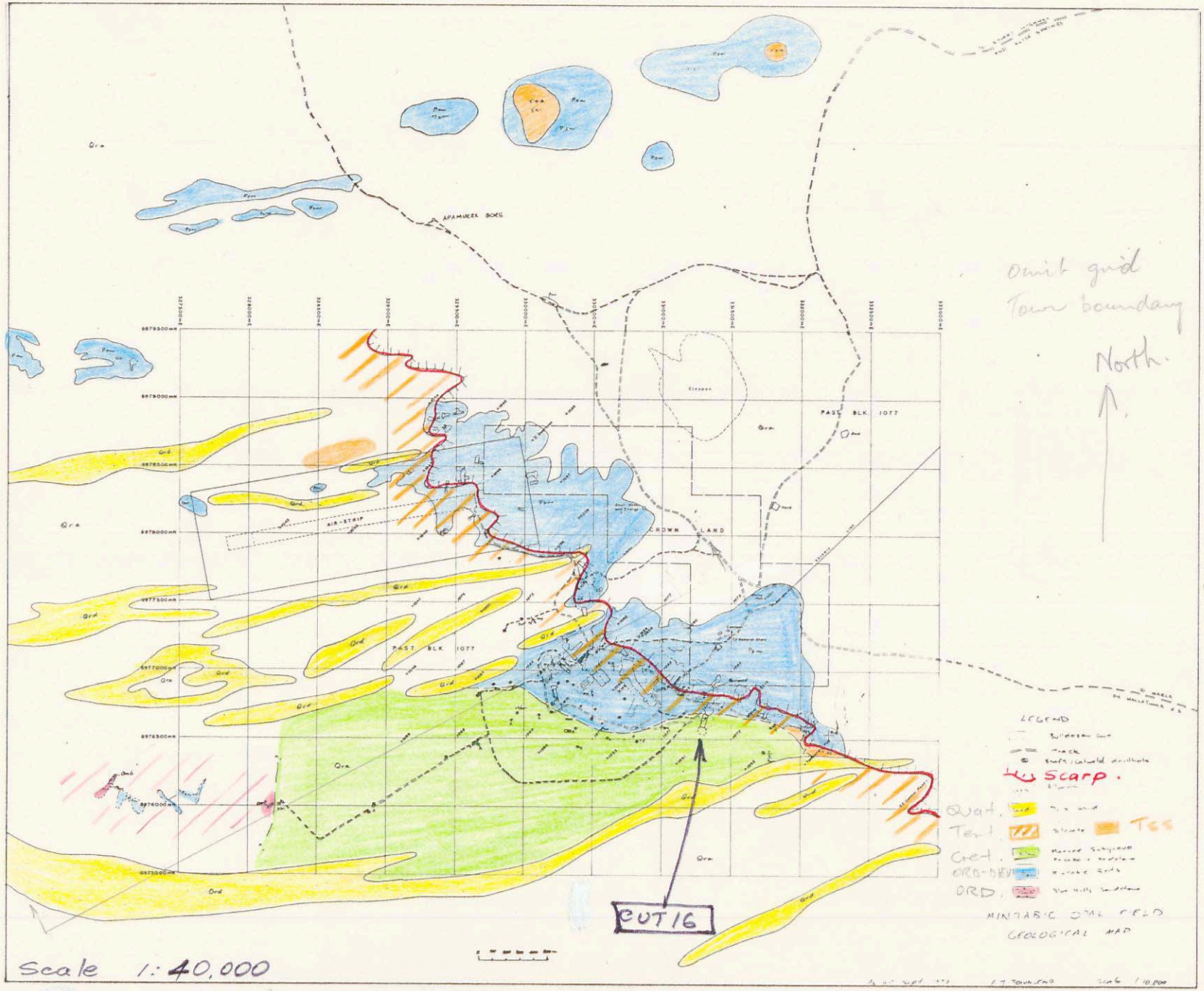
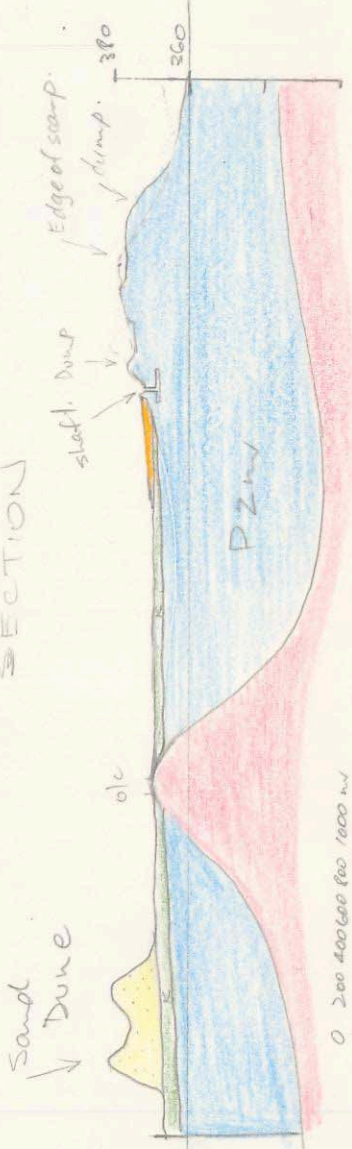
SOUTH AUSTRALIA

Compiled.	MINTABIE OPAL FIELD LOCATION MAP.	Date:
Drn. / Ckd.		Drg. No.

P.F. No. 55850 994.2





MINTABIE OPAL FIELD GEOLOGICAL MAP. FIG. 2.