R/B 65/68

DEPARTMENT OF MINES
SOUTH AUSTRALIA

COPPER PROSPECT - PANDURRA

PRELIMINARY REPORT

Hd. Handyside

by

M.O. MASON
GEOLOGIST
METALLIC MINERALS SECTION

CONTENTS

FIGURES

Rept. Bk. No. 65/68
G.S. 3807
D.M. 1415/67

5th October, 1967

DEPARTMENT OF MINES
SOUTH AUSTRALIA

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PRELIMINARY REPORT

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ABSTRACT

Detailed geological mapping at the Pandurra Copper Prospect has indicated significant mineralization of a fault zone and there is also possibility of copper concentrations along the Whyalla sandstone-Tregolana shale sedimentary contact and the disconformity at the top of the Pandurra formation.

It is suggested that exploration of the fault at depth and of the boundaries, noted above, is warranted; diamond drilling is recommended.

INTRODUCTION

Following a recommendation from the Regional Mapping Section a geological investigation of the Pandurra Copper Prospect (County Manchester) was carried out during September. This land is leasehold with mineral rights reserved to the Crown and is within an area reserved from the operation of the Mining Act between latitudes 32°35' and 32°45'S and longitudes 137°20' and 137°31' E.

Copper was discovered at this locality at the end of the nineteenth century when prospecting traced copper carbonate mineralization by sinking about 30 shallow pits, shafts and costeans. All have now at least partially collapsed, the deepes

being 15ft. There is no record of production.

Following regional geological reconnaissance, detailed geological mapping of the property was undertaken during the week ended 29th September, 1967, by the author; a topographic theodolite survey was made with the assistance of A. Hack.

REGIONAL GEOLOGICAL SETTING

The Pandurra Copper Prospect is located within a small outcrop of Upper Proterozoic sediments 1.5 miles south-east of Pandurra H.S. on a broad alluvial plain margined to the east by Simmon's Hill-Tent Hill plateau and to the west by a low range of hills culminating locally in Tank Hill (See Fig. 1).

On Eyre Peninsula, older Precambrian basement rocks comprise granitic gneisses, metasediments and the Middleback Group of sedimentary iron formations. Metamorphosed coarse clastic sediments which rest unconformably on this "basement" include the Moonabie Formation and the Corunna Conglomerate. These formations have been intruded by granite and porphyry.

Flow basalt at Old Roopena H.S. locality probably marks the basal unit of the Upper Proterozoic Adelaide System on the Stuart shelf; discontinuous sedimentation followed. Grits, sandstones and quartzites of the succeeding Pandurra formation are separated disconformably from the younger Whyalla Sandstone which passes up into Tregolona Shale and Tent Hill formation.

The Whyalla sandstone member is a medium to coarse grained arkosic cross bedded sandstone with coarse sandstone and conglomerates at the base. The pebbles at the base are well rounded and sorted (average 20mm. diameter). The surface of disconformity with the underlying Pandurra Formation is observable some six miles to the south of Pandurra H.S. This surface is considered to be that which acted as a stratigraphic control in copper mineralization in the Mt. Gunson-Pernatty Lagoon locality some 90 miles to the north. The Tregolana Shale is a fine grained shale with minor siltstone and sandstone; manganese hematite layers are common near the copper prospect. These strata are deeply weathered and bleached white to a depth of around 50ft.

Though rocks comprising the basement are generally tightly folded, the Upper Proterozoic sediments are only gently inclined (5^{o}-20^{o}) and are virtually flatbedded over large areas, (local incidence of upturned strata in these tracts are referable to faulting - See figs. 2 and 3).

Late Tertiary and Recent uplift and weathering has resulted in a few silicified sandstone remnants and a veneer of alluvium on the older rocks over wide areas.

The disposition of outcrops of the various rocks in the region are shown on the Corunna Geological map[1] while Thomson[2] has revised the stratigraphic correlations.

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(1) Corunna Geological Map - 1 inch = 1 mile Series.
Johns, R.K.; Solomon and Miles (1952).

(2) The lower boundary of the Adelaide System and Older basement relationships in South Australia.
Thomson, B.P. (1966)
J. Geol. Soc. Aust. 13 (1) pp. 203-228.

DETAILED GEOLOGY, PANDURRA COPPER PROSPECT

The mine workings are located along a shear or fault zone which is only a few feet wide and dips steeply to the west, strikes in a north-south direction and separates Tregolona shale to the west from Whyalla sandstone to the east (See Fig. 3).

The Whyalla sandstone which dips at low angles to the east, even adjacent to the fault zone, consists of coarse grained highly weathered arkosic sandstones and conglomerates of well rounded and sorted quartz pebbles.

Tregolona shale is on the downthrow side of the fault and is a fine grained, finely banded argillaceous shale with minor manganese-hematite layers. This formation dips steeply to the west adjacent to the fault but a few tens of feet away from the fault it regains the 0 to 10° regional dip to the east.

Towards the south the line of workings bifurcates: the westernmost appears based on the extension of the fault while the eastern line may be on a bifurcation of the fault or conceivably follows the Whyalla sandstone-Tregolona Shale contact.

Copper and manganese mineralization has been disclosed in most of the shallow workings. Manganese, with hematite, concentrations are greatest within and near the fault - as nodules within the fault zone, as coatings of joints and bedding planes of the Whyalla sandstone and in thin layers within the Tregolona shale. Copper occurs as malachite and to a lesser degree azurite in lines of nodules and coatings on shears within the fault zone and parallel to the shear plane direction. Also as nodules

along the expected boundary between Whyalla sandstone and Tregolona shale on the southeastern line of workings. And again as nodules and smears on bedding planes within a completely weathered stratiform layer (See Fig. 5) within the Tregolona Shale.

Gypsum occurs in the shear axial fold planes within the fault zone and also in joints and bedding planes within the Tregolona shale and Whyalla sandstone. The gypsum disappears at depth and is a surface weathering phenomenum only.

CONCLUSIONS

Copper mineralization disclosed in the lines of shallow workings is confined to:-

.... a narrow fault zone separating Tregolona Shale and Whyalla sandstone.

.... a suspected sedimentary contact between Tregolona shale and Whyalla sandstone.

.... a narrow stratiform layer within the Tregolona shale.

This mineralization is probably caused by the leaching and transport from the fault zone and deposition within a completely weathered calcareous stratiform layer by near surface agencies.

It is not known if manganese-hematite mineralization is related to the Tregolona shales but are suspected as the origin.

As economic concentrations of copper have been detailed at the Mt. Gunson-Pernatty Lagoon locality at a similar stratigraphic level, it is conceivable that the copper within

the fault zone at the Pandurra prospect has been derived from a similar buried stratiform deposit.

RECOMMENDATIONS

To probe the fault and buried sedimentary and disconformable surfaces the following drilling is recommended:-

.... One diamond drill hole on the western side of the fault (See Fig. 4) and 200 feet from it inclined 60° to the east to intersect the fault zone 200 feet beneath the open cut and to intersect the Tregolana Shale-Whyalla sandstone contact at a shallower depth.

.... One diamond drill hole inclined 50° to the southwest on the east side of the bifurcation would also prove the presence or otherwise of a bifurcation of the fault, mineralization within the fault and possibly the Pandurra formation unconformity. A total depth of 300 feet for this hole is indicated.

M.G. Mason

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GEOLOGIST
METALLIC MINERALS SECTION

MGM:SMA
5.10.1967

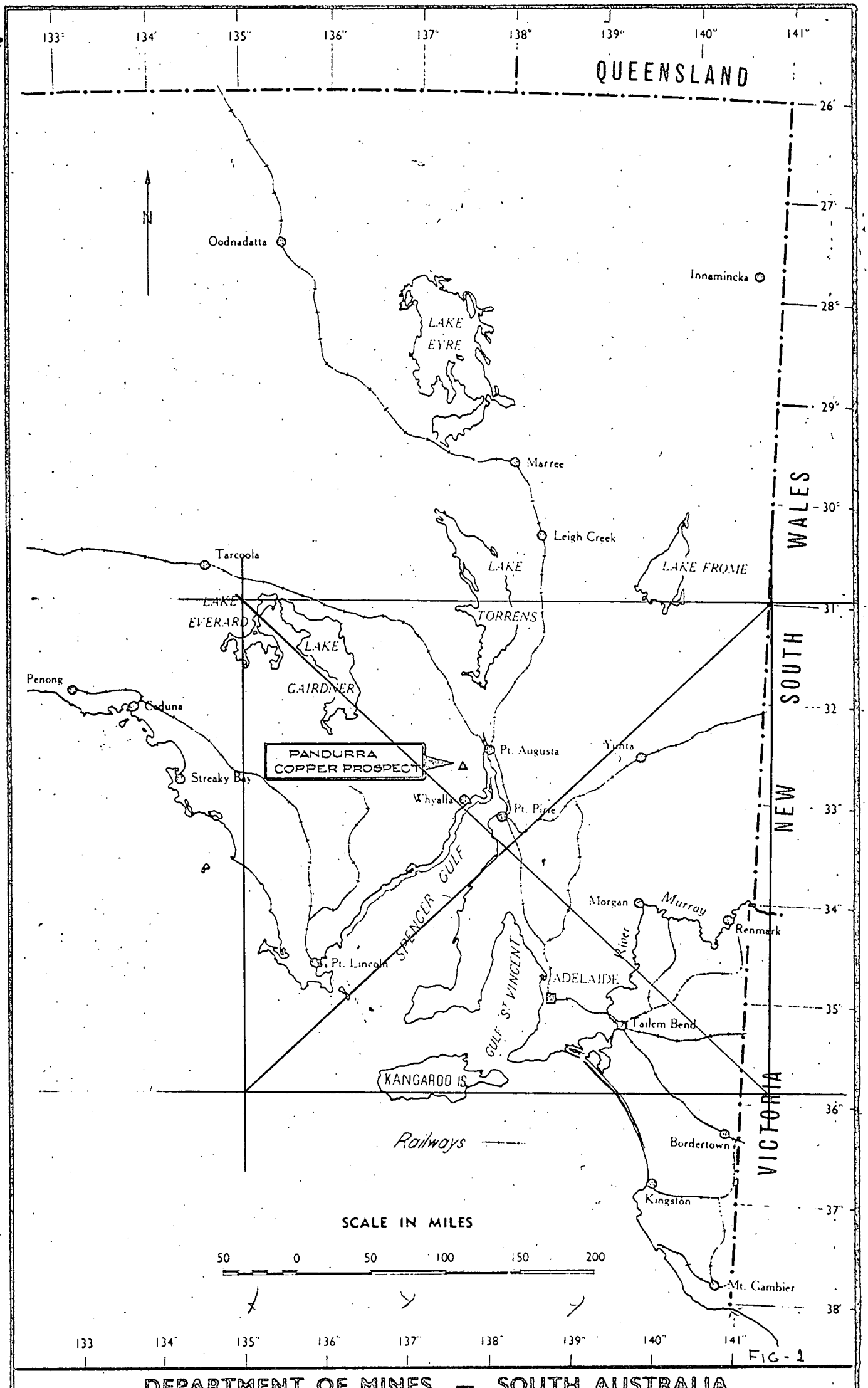
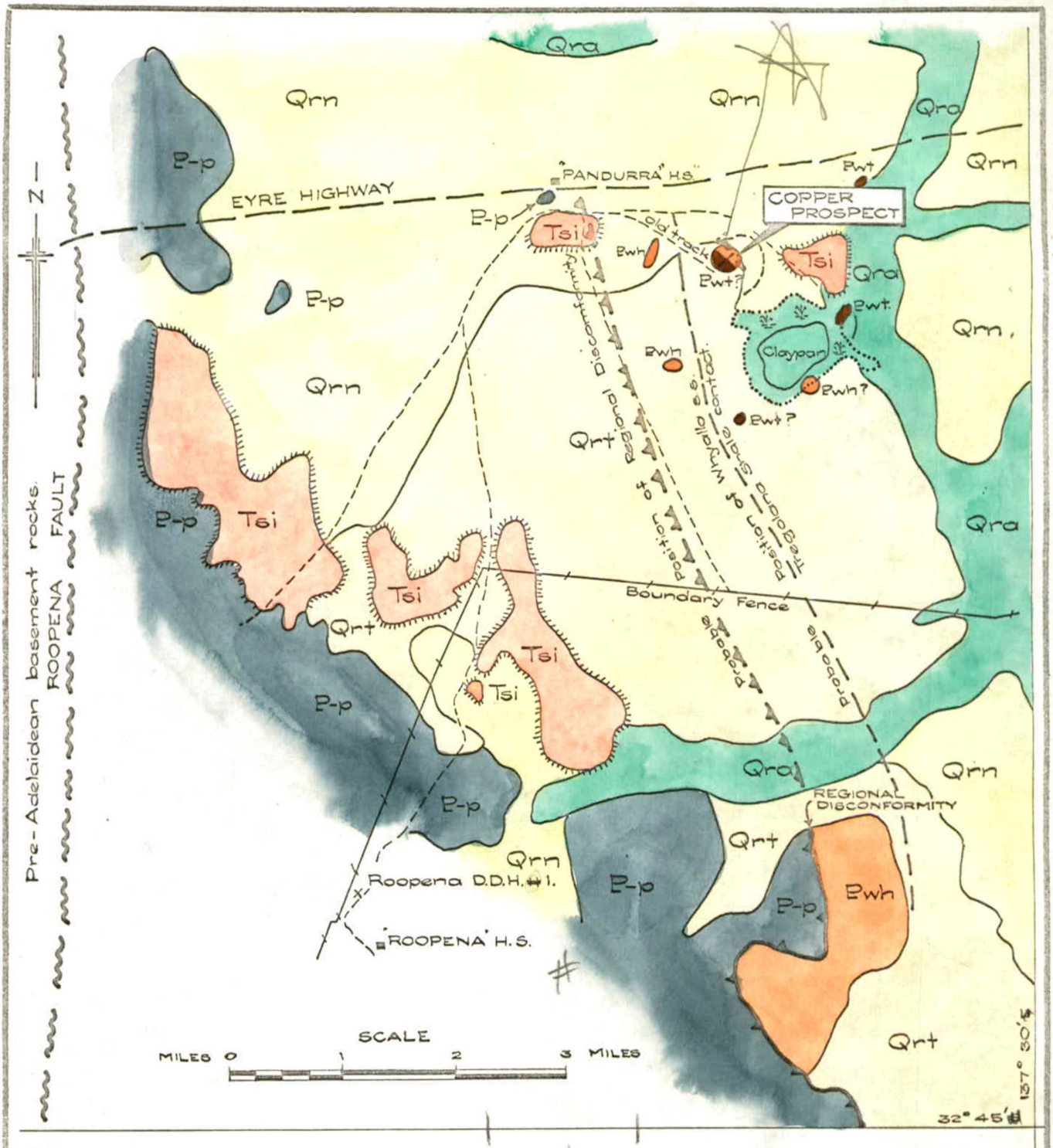


FIG - 1

DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn. B.T	COPPER PANDURRA PROSPECT 23 MILES S.W. PT AUGUSTA LOCALITY PLAN	SCALE: As shown.
	Tcd. AM&D		S6137 Ea3
	Ckd.		
	Exd.		DATE: 2 October '67

P.F. No. S 5850 994·2



LEGEND

QUATERNARY	Qra	Alluvium of drainage channels and claypans.
	Qrt	Low angle slope deposits.
	Qrn	Residual soils and thin alluvium on shallow bedrock.
TERTIARY	Tsi	Silcrete capping including quartz sands and gravels
MARINOAN	Pwt	TREGOLANA SHALE
	Pwh	WHYALLA SANDSTONE.
		Regional Discomformity
TORRENSIAN–WILLOURAN	P-p	PANDURRA FORMATION

From B.P. Thomson. 7 Sept. '67 (67-687) for Detailed Geology.

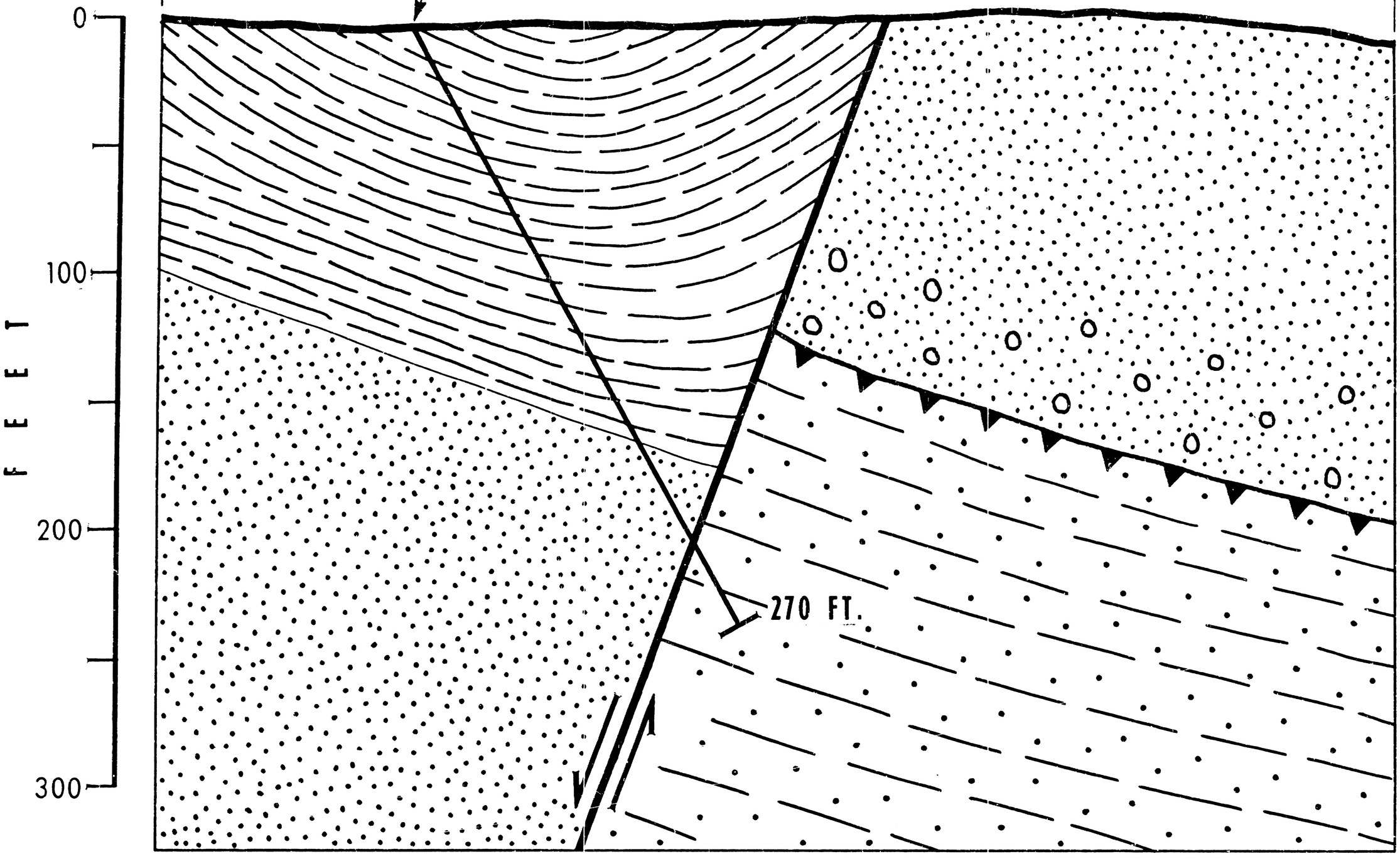
DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn. BT.	COPPER PANDURRA PROSPECT 23 MILES S.W. PT AUGUSTA REGIONAL GEOLOGICAL PLAN	SCALE: As shown.
	Tcd. AMcD		56138 Ea3
	Ckd.		
	Exd.		DATE: 4-10-67

WEST A

PROPOSED D.D.H.1

A EAST



SECTION A-A

WEST B

PROPOSED D.D.H.2

B EAST

SECTION B-B

LEGEND

PROTEROZOIC

MARINOAN

Tregolana Shale

Whyalla Sandstone

Pandurra Formation

Regional Disconformity

Fault Zone

SCALE

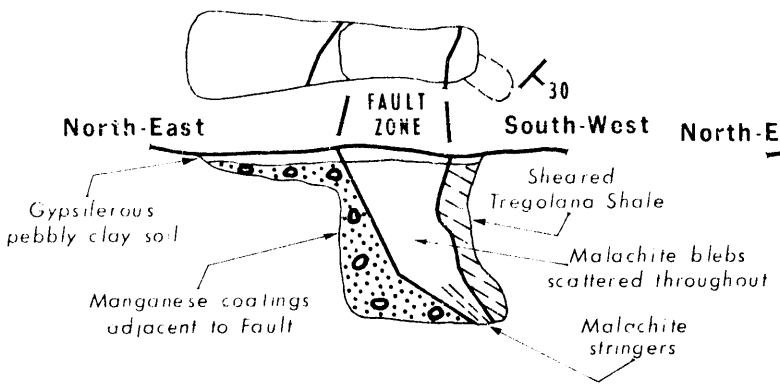
FEET 100 50 0 100 200 FEET

67-689

M.G. Mason, Geologist

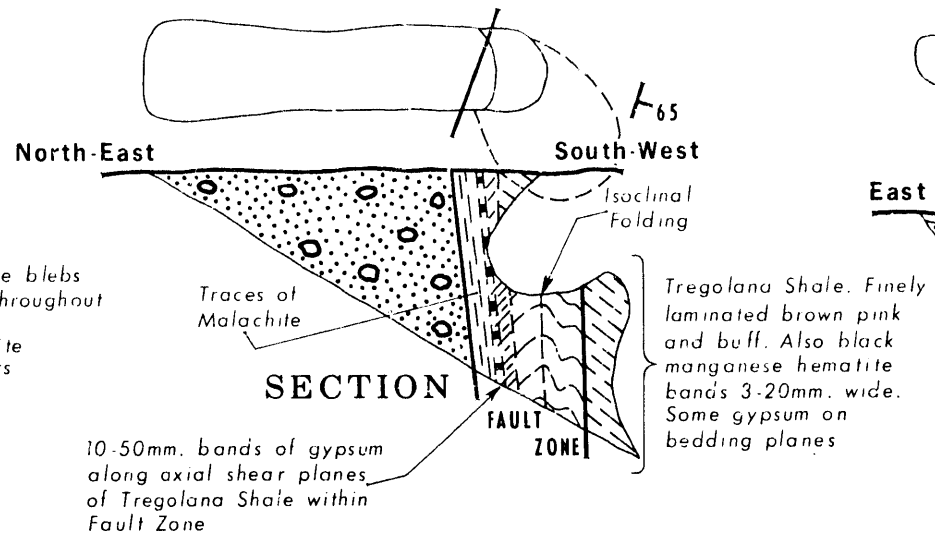
S.A. Dept. of Mines

① PLAN



SECTION

② PLAN



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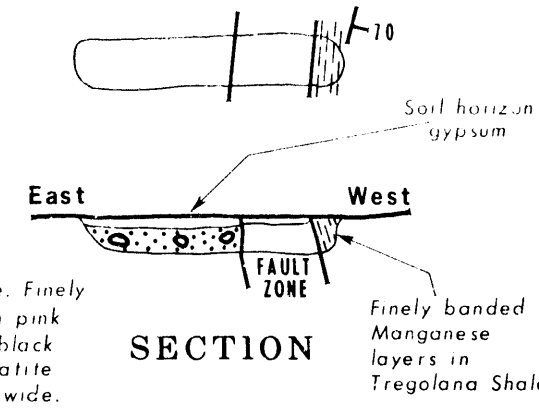
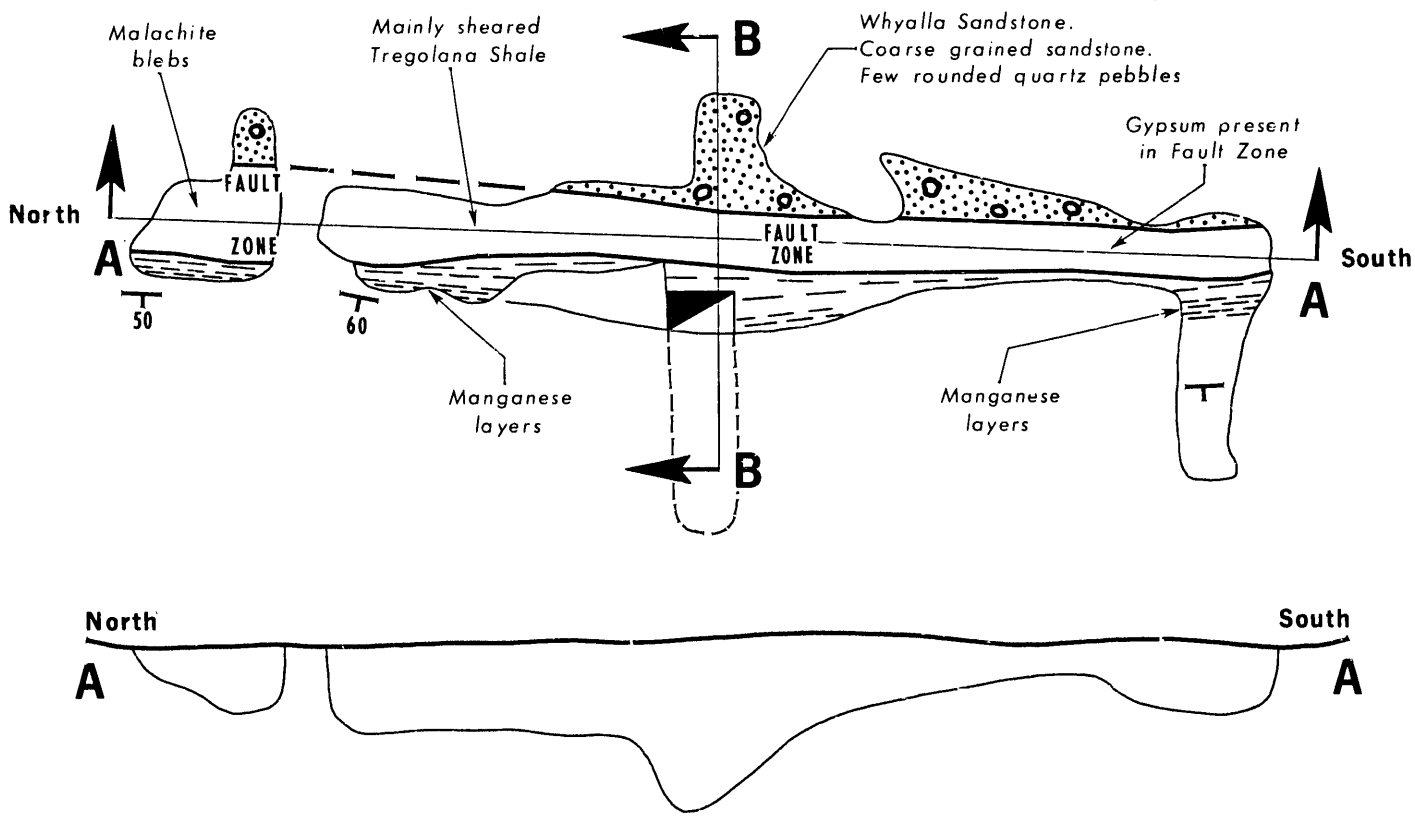
③ PLAN

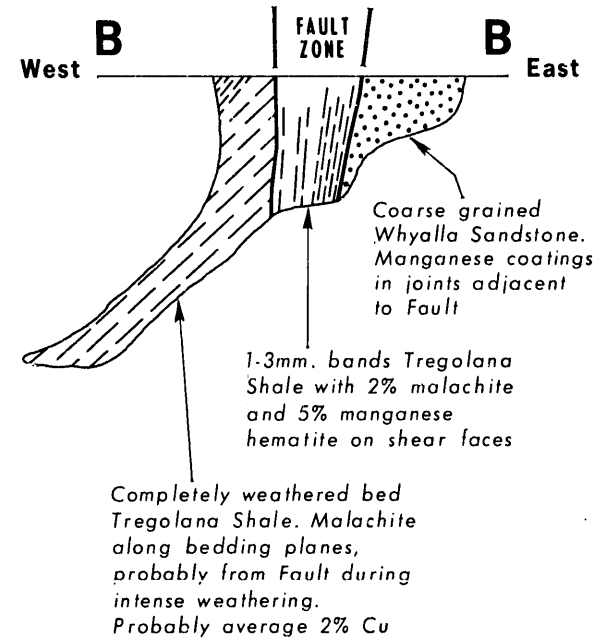


SECTION

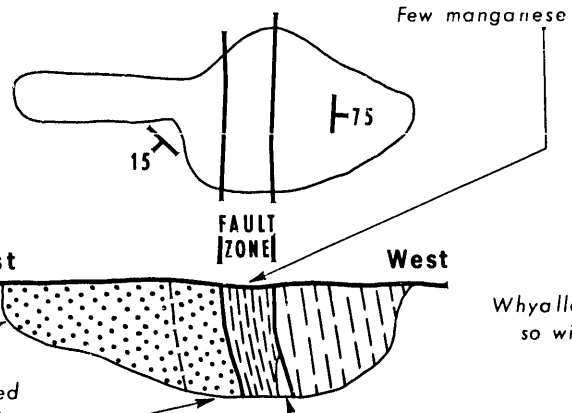
④ ⑤ PLAN



SECTION

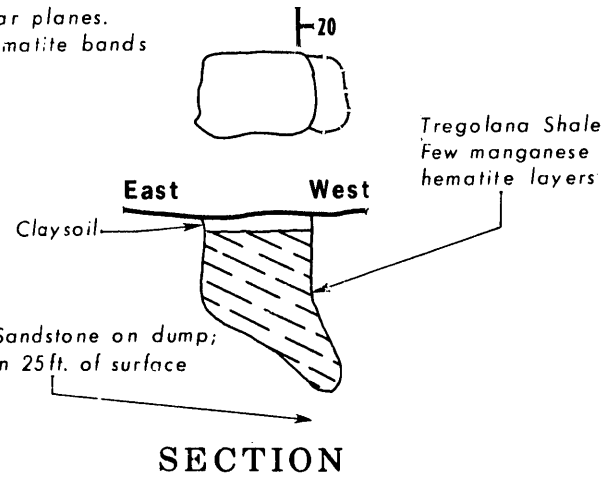


⑥ PLAN



SECTION

⑦ PLAN



SECTION

REFERENCE

Projection of underground workings to the surface

Shaft

Limit of Fault Zone — FAULT ZONE

Strike and Dip of Bedding — 75

SCALE

FEET 0 5 10 15 20 25 FEET

LEGEND

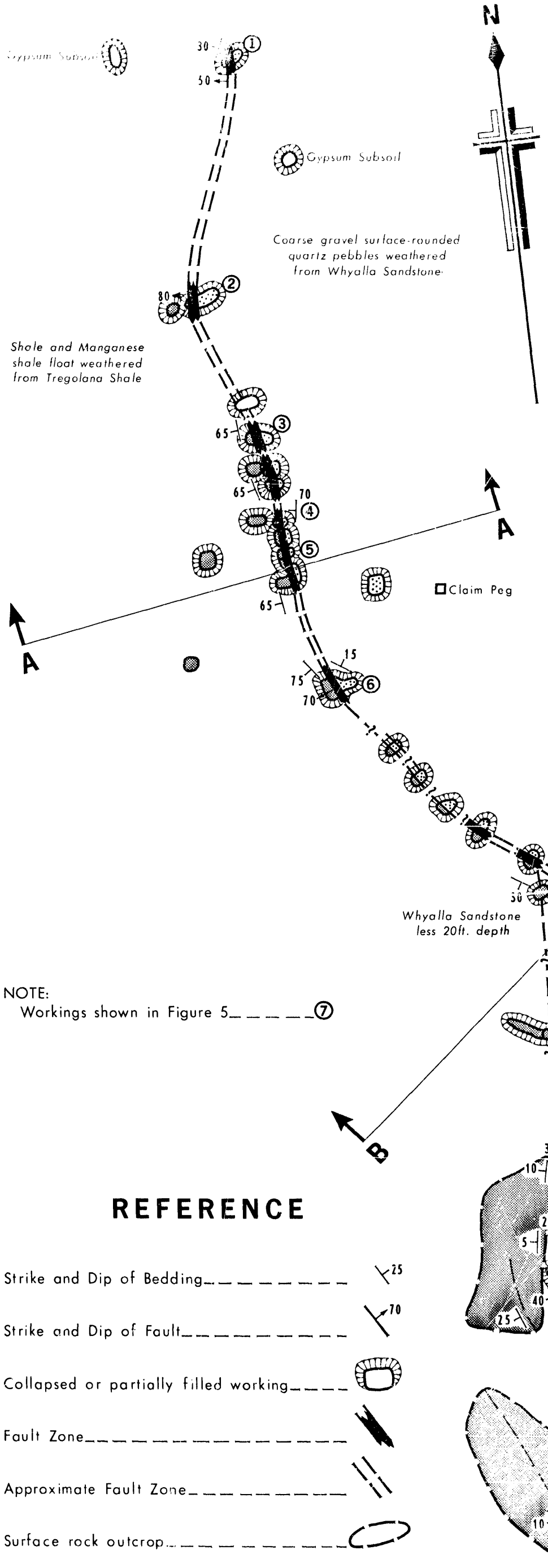
MARINOAN

TREGOLANA SHALE
Pink buff and brown. Fine grained. Fine laminated argillaceous shale, siltstone and few manganese hematite layers

WHYALLA SANDSTONE
Coarse grained Feldspathic highly weathered sandstone to conglomerate

M.G. Mason, Geologist

S.A. Dept. of Mines



Claim Peg □

LEGEND

QUATERNARY

Surface gravels and red brown clayey sands. Fragments of bedrock included_ _ _ _ _ _

MARINOAN

TREGOLANA SHALE

Sandy and silty shales. Manganiferous in part, finely laminated, weathered brown_ _ _ _ _

WHYALLA SANDSTONE

Pink to red, medium to coarse-grained, highly weathered sandstone, also coarse well sorted conglomerate bands_ _ _ _ _

NOTE:
Workings shown in Figure 5_ _ _ _ _ ⑦

REFERENCE

Strike and Dip of Bedding_ _ _ _ _ _ _ _ 25

Strike and Dip of Fault_ _ _ _ _ _ _ _ _ 70

Collapsed or partially filled working_ _ _ _

Fault Zone_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Approximate Fault Zone_ _ _ _ _ _ _ _ _

Surface rock outcrop_ _ _ _ _ _ _ _ _ _ _

SCALE

FEET 0 100 200 300 FEET