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Record 1965/112

GEOLOGICAL REPORT ON THE GREAT DAVENPORT GOLD PROSPECT KURUNDI GOLDFIELD.

by

W.S. Yeaman

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RECORDS 1965/112

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SUMMARY:

The Great Davenport is an auriferous quartz reef situated about 90 miles south-west of Tennant Creek on the northern flanks of the Davenport Ranges in the Northern Territory.

The reef is located near the intersection of a north-north-east trending normal fault with an arcuate anticlinal axis plunging to the west-north-west. There appear to be two periods of folding and the maximum age of the mineralisation is tentatively assigned to the later period. Distribution of gold values appears to be highly erratic; visible gold associated with pyrite and pyritic boxworks occurs near the anticlinal axis at the south-south-west end of the reef. Gabbro crops out close to several other auriferous reefs in this general area, and it is suggested that the mineralisation derives from a basic igneous source.

Wagon drilling is recommended to provide more information on structure and distribution of gold. It is also recommended that repetitions of the localising structures should be examined on a regional scale. Geochemical studies of gossans and prospecting of other reefs associated with gossans is also recommended.

INTRODUCTION:

The Great Davenport Gold Prospect is situated on the northern side of the main watershed of the Davenport Ranges at longitude 134°29'E latitude 20°45.6'S, 10.2 miles on a true bearing of 200° from Kurennelli. It is accessible by road from Kurundi Station by taking the Kurennelli track to a point about one mile west of Kurennelli, and then following a graded track for about twelve road miles in a south-south-westerly direction. (Plate 1.)

HISTORY:

Mr. Charles Priester, a local prospector, discovered the prospect by dollying and panning in January 1964, and pegged it in March of the same year. It was subsequently sold on option to a syndicate consisting of Messrs. G. Farrel, G. Barton, A.F. Campbell and H. V. Leonard. Peko-Wallsend Investments Ltd., later negotiated an agreement to carry out a comprehensive programme of exploration and to acquire a controlling interest if the results are encouraging.

REGIONAL GEOLOGY.

The country rocks consist of dominantly arenaceous sedimentary rocks which are part of the Hatches Creek Group (Smith et al 1960). They are predominantly medium to coarse-grained, exhibiting current-bedding, and are generally silicified on surface exposures.

The Great Davenport Gold Prospect is a quartz reef, or series of reefs, located near the intersection of the axis of a broad anticline, which plunges at 30° to the west-north-west, and of an east-north-east trending linear feature, which is thought to be a fault. (Plate 2.)

The trace of the anticlinal axis is curved, convex to the north. The north-north-east-trending linear feature appears to be confined to the convex (north) side of the anticlinal axis, and it may represent a normal fault which developed as a tension opening during the southward bending of the anticlinal axis by a later period of cross-folding.

To the west-north-west the Great Davenport anticline appears

to run into a major south-south west-plunging syncline, the axis of which is situated about 4 miles west-north-west of the Great Davenport Prospect. This synclinal axis does not appear to be deformed and may post-date the Great Davenport anticline. Further evidence for probably later cross-folding in the Davenports is provided by the frequent domal structures and short sigmoidal sections in the axes of the predominant west-north-west folds (Smith et al 1960.) The north-north-east linear feature, which partly controls the Great Davenport mineralisation, is thus parallel to the axial plane direction of the later syncline, and the maximum age of the mineralisation might be tentatively assigned to this period of folding.

A small gold prospect called "The Aztec" is situated about ¾ mile west-north-west of the Great Davenport, and a minor gossanous quartz reef, reported to carry a few colours of gold, is situated a further ¼ mile in the same direction. An extensive mass of gabbro extends northwards from the Aztec, and similar basic intrusives containing auriferous quartz reefs occur near Kurennelli. Petrographic examination suggests that the gabbro near the Aztec has been subjected to greenschist facies metamorphism or to low-grade autometamorphism. (see Appendix I).

DETAILED GEOLOGY AND ASSAY RESULTS:

Structure of the Quartz Reefs.

The Great Davenport is located near the intersection of an arcuate major anticlinal axis and a fault which is almost normal to that axis. The bedding can be readily followed round the north flank of the anticline, where thin lenses of quartz can be traced parallel to the bedding at about the same stratigraphic horizon as the Great Davenport. Numerous thin quartz stringers parallel to the fault can also be observed in the low cliff face north of the road about ¼ mile north east of the prospect.

Current-bedded sandstone which forms these cliffs on the north flank of the anticline is apparently displaced south-wards on the east side of the fault. However since the fault neither displaces nor crosses the anticlinal axis, it can be concluded that the movement on the fault is normal (east block down) with no horizontal component but with pivoting at the anticlinal axis. This movement would require a minimum stress component approximately parallel to and confined to the north (convex) side of the curved anticlinal axis, such as could be developed by the stretching of the north flank during a later period of cross-folding.

Country rocks in contact with the Great Davenport quartz reef are silty grey-brown and grey-green shales. Several sets of planar structures have been observed in these shales, but none of these structures were parallel to the bedding of the nearby sandstones, and they probably represent varieties of cleavage rather than bedding.

A number of pits were excavated on the prospect and the quartz reefs exposed in them are almost parallel to the bedding of the competent sandstone which forms a line of low cliffs to the west and north of the prospect. The true width of the reef or reefs varies from 2 inches in the western portion of costeans No. 24 and No. 26, to 10 inches in the central part of the north-south costean, and to more than 5 feet as tested by jackhammer and drill-steel in other costeans. The pinching out of the quartz reef to the west observed in costeans 26 and 27, suggests that there is little chance of finding auriferous quartz more than about 60 feet from the north-north-east fault. However, this possibility should be further investigated by wagon drilling.

STRUCTURE OF THE QUARTZ REEFS (continued)

Mineralogy.

The gold occurs as flake and as coarse gold. The flake gold is thought to be of secondary origin and commonly forms short flakes up to 1/8 inch long on fracture and joint planes in otherwise barren white quartz. The coarse gold is thought to be of primary origin and is associated with fine-grained pyrite, pyritic boxworks and with rose-red, lemon-yellow and dull grey varieties of quartz. Geochemical investigation of the nearby gossan showed an absence of arsenic (see below), so that the sulphides in the quartz reef are probably also free from arsenic. Kaolinitic films are well developed on joint planes in the auriferous quartz.

Gossan.

Red hematitic gossanous material occurs over a width of about eight feet in a shallow gully about 350 feet south of the open cut. The ground between the gossan and the reef is scree covered, so that the structural relation of the gossan to the quartz reef is not known. A random grab sample of gossan assayed 1.3 dwts gold per ton. The gossan therefore warrants some further investigation, as it may be derived from pyritic material such as occurs in association with the primary gold in the open cut.

Assays. (Plate 3.)

The best assays were obtained from the open cut and from the north-south costean, but very poor results have been obtained elsewhere in the reef. However, too much significance should not be given to the results of individual determinations since the very patchy distribution of the gold shows that only bulk sampling would provide a satisfactory over-all assessment of the prospect. Some of the small pockets of rich primary material are estimated, by panning, to contain up to 10 ounces of gold per ton.

A. OPEN CUT (horizontal chip samples).

	ASSAYS (dwts gold per ton.)
0 feet to 4 feet	17.6
17 feet to 23 feet	2.2
23 feet to 27 feet	5.1
27 feet to 31 feet	27.9
31 feet to 35 feet	1.2

(N.B. 0 feet = East wall of north-south costean)

B. OPEN CUT (chips at 8-inch centres).

	ASSAYS (dwt gold per ton).
Sample Zone A.	11.4
Sample Zone B.	3.3
Sample Zone C.	2.0

C. NORTH SOUTH COSTEAN. (90 feet long costean on south-east side of the reef) (Chip samples).

23 feet to 36 feet, over 10 inches true vertical width	10.4
39 feet to 53 feet, over 10 inches true vertical reef width	3.5

C. NORTH SOUTH COSTEAN (continued)

(N.B. 0 feet = north-east end of the costean. No samples were taken in this costean except in these two zones, and where the open cut adjoins this costean, as the reef is not exposed in vertical section outside these zones).

D. NORTH SOUTH COSTEAN (channel sample)

	ASSAYS (dwts.gold per ton).
Vertical channel sample over 4 feet of reef exposed, on east wall of costean, opposite junction of costean and open cut	14. 5

E. OTHER COSTEANS.

COSTEAN NO. 25.

Over exposed face of quartz lens, 1 foot x 2 feet, at east end of costean.	0.9
8-inch intersection in jack hammer hole	Trace.

COSTEAN NO. 24.

Not sampled, only 2 inches thickness of quartz exposed.

COSTEAN NO. 23.

Over exposed face of quartz on costean floor, 7 feet x 4 feet.	Trace.
5-foot jackhammer hole in floor of costean, at right angles to exposed face on floor (Reef thickness greater than 5 feet).	Trace (estimated by panning)

COSTEAN NO. 22.

Over exposed face of quartz on floor, 6 feet x 3 feet	Trace.
5-foot jackhammer hole. (Reef thickness greater than 5 feet)	Trace (estimated by panning)

COSTEAN NO. 21.

Over exposed face of quartz on floor, 7 feet x 3 feet.	Trace.
5-foot jackhammer hole. (Reef thickness greater than 5 feet)	0.8

E. OTHER COSTEANS (continued)

COSTEAN NO. 20.	ASSAY (dwts. gold per ton).
Over exposed face of quartz on floor of costean, 16 feet x 3 feet	0.2
5-foot jackhammer hole. (Reef thickness greater than 5 feet)	1.7
Vertical channel sample over 2 feet at west end of costean.	Trace.
COSTEAN NO. 26.	
Vertical channel sample over 2 feet (true reef thickness), 22 feet from west end of costean.	3.5

Where the north-south costean adjoins the open cut, the 0 - 4 feet horizontal chip sample of 17.6 dwts and the vertical channel sample of 14.5 dwts form roughly two sides of a parallelogram, but the same area averaged 7.1 dwts (sample zone D), when it was sampled by taking chips from the corners of 8-inch side equilateral triangles throughout the zone. These samples therefore only give approximate indications of what grade might be expected and no calculations of ore reserves can be based on them.

Note on Sampling Methods. The original assays from the open cut (1.2, 27.9, 5.1, 2.2 and 17.6 dwts of gold per ton) were obtained by taking a series of chips from a projecting edge of quartz. The method employed later was to collect chips as near as possible from the corners of equilateral triangles (about 8 inch side) throughout each sample zone.

The jackhammer holes were sampled by collecting the cuttings in a prospecting pan placed behind the drill steel .

GEOCHEMISTRY.

Gossans.

GREAT DAVENPORT GOSSAN.

Samples of gossan from the Great Davenport and from gossans associated with other reportedly auriferous quartz reefs were spectrographically analysed by A. D. Haldane of the Bureau of Mineral Resources.

Results in parts per million:-

	Ni.	Co	V.	Cu	Zn.	Pb.	Mo.	As.
Great Davenport (average of 2 samples)	260	45	250	370	370	a	17	3
Quartz Reef 1 Mile west-north-west of Great Davenport. (average of 3 samples)	230	55	560	150	380	2	11	22
Aztec (average of 4 samples)	60	30	180	30	60	1	36	22

GREAT DAVENPORT GOSSAN (continued)

	Ni.	Co	V.	Cu	Zn	Pb	Mo	As
Uralitised and saussuritised gabbro adjacent to Aztec (1 Sample)	150	50	-	100	a	200	a	-
Granophyre associated with this gabbro (1 sample)	10	10	-	7	a	30	5	-

NOTE: (-) = not sought. (a) = sought, but not detected.

Gold was recognised spectrographically in the samples from the Aztec prospect. The close association of auriferous quartz reefs and gabbro at the Aztec and also at Kureneilli suggests that the gabbro may be the source of the mineralisation which was responsible for the gossans associated with the quartz reefs. However, it is surprising that lead, which is present in significant amounts in the gabbro, is almost absent from the gossans, while zinc, ~~and vanadium~~, which occur in all the gossans, ~~are~~ is absent from the gabbro.

Geochemical Drainage Prospecting.

Stream silt from creeks draining the Great Davenport indicated a background of 6 p.p.m. Cu, with 10 p.p.m. Cu closer to the prospect. Although these results indicate an anomaly, the contrast is very low and it is doubtful whether the method would be a reliable exploration technique.

RECOMMENDATIONS:

A programme of wagon drilling is proposed, mainly in order to determine if the reef extends down the pitch of the anticline. If the drilling shows that the quartz reef, or reefs, do not extend for any great distance down the pitch of the anticline, the only chance of finding a reasonable tonnage would be by locating additional reefs which might exist down the line of the fault. It is therefore proposed that a waggon drilling programme should be carried out as follows:

(A) Drill W.D.H.1 vertically to 200 feet. If no additional reefs are located at depth, all subsequent holes can be shortened accordingly.

(B) W.D.H.'s 3 to 20 have been designed to cover the possible extensions of the known reefs down-dip to the west and along strike to the north and south. However, some of these holes may not be required if early results show that the extent of the reefs is limited in any particular direction.

(C) The ground between the reefs and the gossan should also be tested by costeaning and by drilling W.D.H.21. Additional holes may be required if encouraging results are obtained in this area.

(D) Detailed mapping should be extended to include the gossan, and, since the gossan is probably derived from a highly conductive pyritic lode, an electromagnetic or induced potential geophysical survey might assist in locating extensions or repetitions of this lode.

CONCLUSION.

The Great Davenport Gold Prospect is an auriferous quartz reef located near the intersection of a west pitching anticline and a fault. Most auriferous quartz reefs located to date in the Davenport Ranges are associated with gossans and occur in or near gabbro, suggesting that the Great Davenport mineralization may have been genetically related to gabbro.

It is impossible to state the economic potential of the Great Davenport prospect on the information available at present, but further investigation by wagon drilling is recommended to establish its geometry and reserves. Costeans and wagon drill holes should also be put down between the quartz reef and the gossan to the south in order to determine their relationship and to determine the southern limit of pay values. The gossan is auriferous, and may be derived from oxidised pyritic material; so that it also warrants further investigation.

On a regional scale it appears that, in this area, there is no substitute for traditional dollying and panning techniques.

Particular attention should be paid to quartz reefs associated with gossans. The gossans should also be investigated and routine spectrographic analyses of samples are recommended. The presence of gossans suggests that electrical geophysical methods may be of value in this area for locating non-outcropping occurrences of pyritic ore.

Any repetitions of the intersection of the structural features which control the mineralization at the Great Davenport prospect should be thoroughly investigated.

Photogeological interpretation in the vicinity of the gossanous auriferous quartz reefs at the Aztec prospect suggests that they conform to such control.

About 1¼ miles south-south-eastwards along the Great Davenport anticlinal axis there is a sand covered area (Area X Plate 2.) into which a pronounced north-north-east feature appears to be heading. If electrical geophysical methods are found to work satisfactorily at the Great Davenport, this area should also be investigated by such methods.

REFERENCES.

SMITH, K.R., STEWART, J.R., and SMITH, J.W., 1960 — The Regional Geology of the Davenport and Murchison Ranges, Northern Territory. Bureau of Mineral Resources, Australia. Report 58.

APPENDIX I.

File No. 198NT/1

September 9th, 1964.

Extract from Report No. 14.

MINERALOGICAL INVESTIGATION OF TWO ROCKS FROM THE DAVENPORT RANGE AREA, NORTHERN TERRITORY

- by -

I. R. PONTIFEX

Samples submitted by W. S. Yeaman.

Spectrographic analyses done by A. D. Haldane on the optical emission spectrograph.

Field No. 0060232.

Locality: One mile west of Great Davenport Gold Mine.

Registered No. AAD788: Slide No. 14300.

Spectrographic analysis, values in ppm. (a= absent)

Ni	Co	Zn	Cu	Pb	Ag	Au	Mo
150	50	a	100	200	a	a	a

Conclusions:

This rock is essentially a uralitised, saussuratised gabbro. It contains accessory hematite, pyrite, and minor accessory grains of a possible nickel or cobalt sulphide.

The alteration of the rock may have been induced by autometasomatism during the last stages of magmatic crystallisation or by a subsequent phase of low grade regional or contact metamorphism.

The values of Ni,Co and Cu are within the average range of values for these elements in this rock type; therefore they are not necessarily indicative of inherent, economic concentrations. The Pb content is about 20X the average Pb content in this rock type.

Macro description:

A grey green medium-grained crystalline rock with a brown iron-stained weathered surface. Several fine pyrite grains are evident.

Petrographic description:

An igneous rock; it has a predominantly hypidiomorphic texture with an average grain size of about 1.5 mm. The main components are pyroxene and feldspar, both are extensively altered.

The original pyroxene euhedra are replaced to varying degrees by irregular alteration corona of uralic hornblende. This mineral is generally fibrous and some grades imperceptibly into cavities filled with chlorite and minor actinolite. The composite grains or pyroxene and amphibole make up about 50% of the rock.

The feldspar laths measure up to 2 mm. long and 0.5 mm. wide, all are densely clouded with alteration products, mainly sericite with minor, scattered epidote. Indefinite twinning in some relic grains suggests that the felspars were originally a basic plagioclase: however, the R. I. of others indicates that they are albitic.

Interstitial fill material through the rock consists of sericite, chlorite, calcite and minor actinolite. Skeletal opaque grains make up about 2% of the section.

Mineragraphic description:

The majority of the opaque grains consist of hematite, these measure up to 1 mm. Accessory amounts of a white mineral with a slightly yellow and rarely, pink tint and slightly anisotropic occur in skeletal grains up to 0.02 mm. in maximum dimension. Some have an indefinite twinning. The extremely limited abundance of this mineral made a positive identification impossible. On the basis of its optical properties and mode of occurence it is suggested that it may be a nickel or cobalt mineral.

Field No. 0060233

Locality : One mile west of Great Davenport Gold Mine. This is an acid differentiate of 0060232 (Yeaman).

Registered No. AA0789. Slide No. 14301.

Spectrographic analysis, values in ppm.

Ni	Co	Zn	Cu	Mo	Pb	Ag	Au
10	10	a	7	5	30	a	a

Conclusions:

This rock has the mineralogical composition of a fine-grained granite, the incipient graphic intergrowth of quartz and feldspar, however, suggests that it is more specifically a granophyre or felsite, possibly extrusive. On a mineralogical basis the most likely source of this rock is an acid igneous magma.

The values of elements detected by the spectrograph are within the average range of values of these elements for this rock type.

Macro description:

A pink, light brown fine-grained crystalline rock containing pink felspar, quartz and minor chlorite. It has a light brown white spotted weathered surface.

Petrographic description:

This section has a predominantly granophyric texture with an average grain size of about 0.3 mms. The main minerals are quartz and altered felspar with minor chlorite and epidote.

Quartz makes up about 45% of the rock and occurs in allotriomorphic granular aggregates through the section.

The felspar constitutes about 45%, it generally has a light brown clouding, probably due to its alteration product, sericite, being iron-stained. No multiple twinning is evident in the felspars: however, indefinite microcline textures and carlsbad twins are shown by many relic grains indicating that the majority are potash rich.

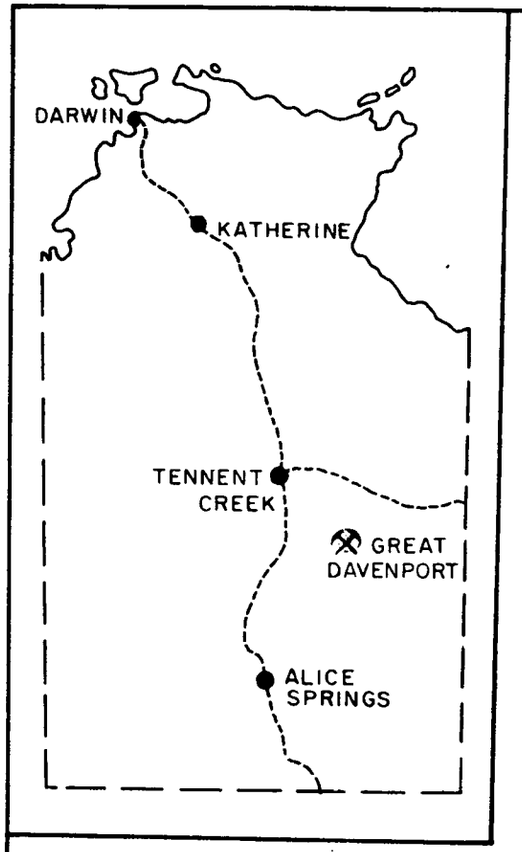
Many euhedral felspar grains (or the alteration products derived from them) are intimately intergrown with small rodlike and bleb-like grains of quartz. Frequently these are concentrated in centric groupings, some pass into somewhat fibrous bleb-like aggregates of a felsitic type.

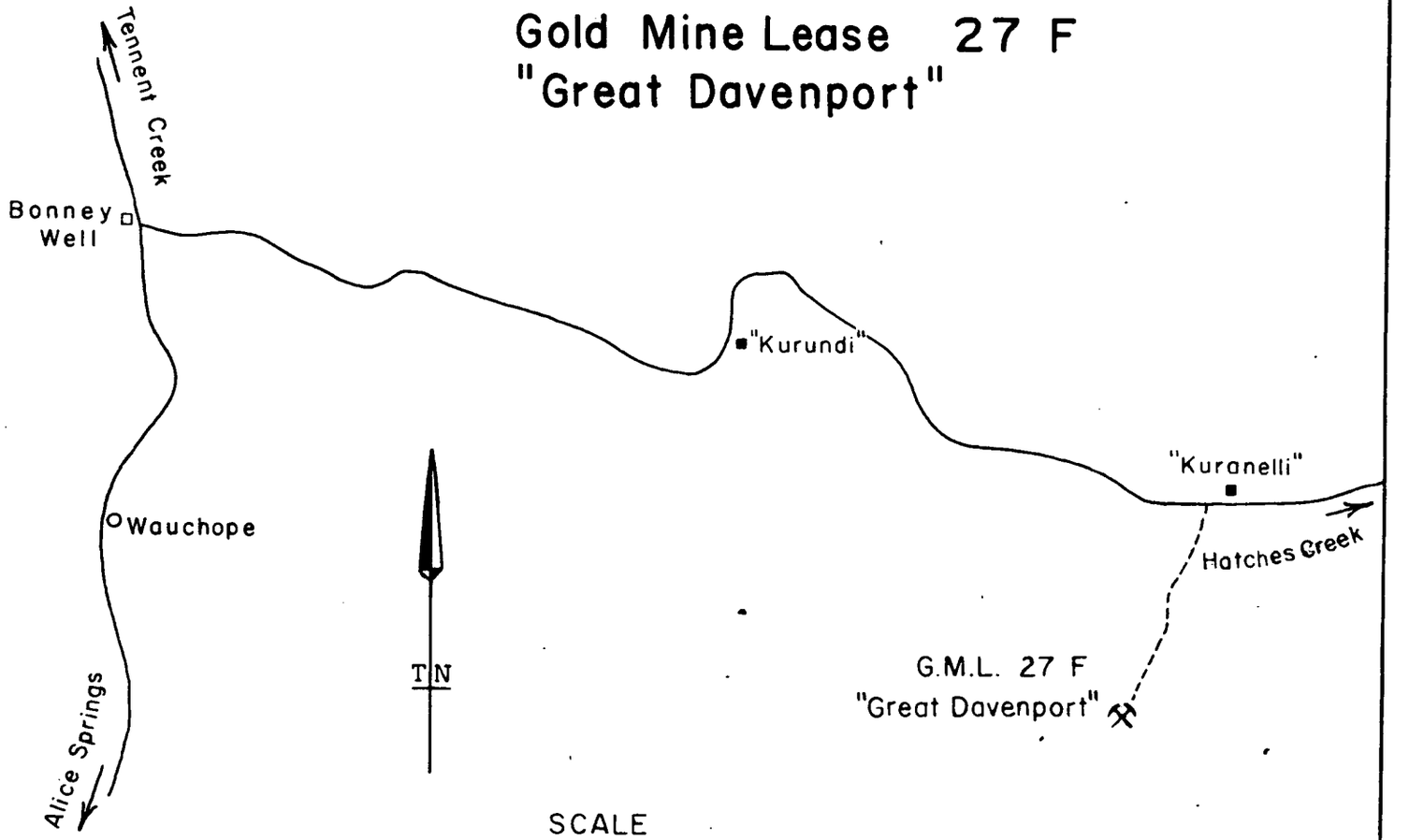
Minor flakes of chlorite (about 5%) and accessory biotite associated with it occur in some interstices. In some parts of the section accessory amounts of a probable epidote mineral are localised along intergranular boundaries of felspar. Opaque minerals make up less than 1% of the section.

PLATE 1

LOCALITY PLAN

Gold Mine Lease 27 F
"Great Davenport"





Bureau of Mineral Resources, Geology and Geophysics *To accompany Record 1965/112* *July 1965*

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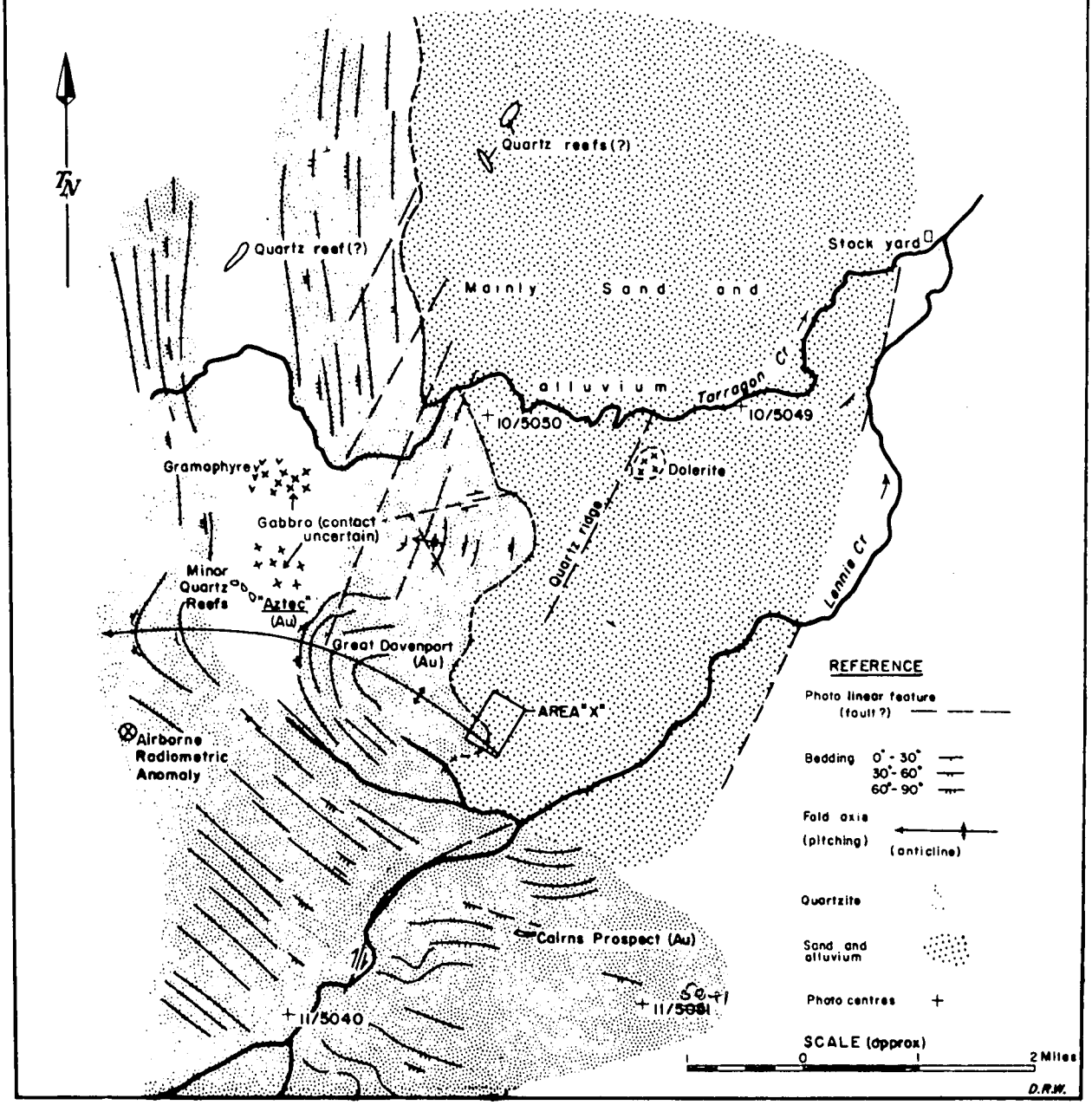
D.R.W.

Kurundi Goldfield

Plate 2

PHOTOGEOLOGICAL and LOCALITY MAP



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NT/A/115

Plate 3

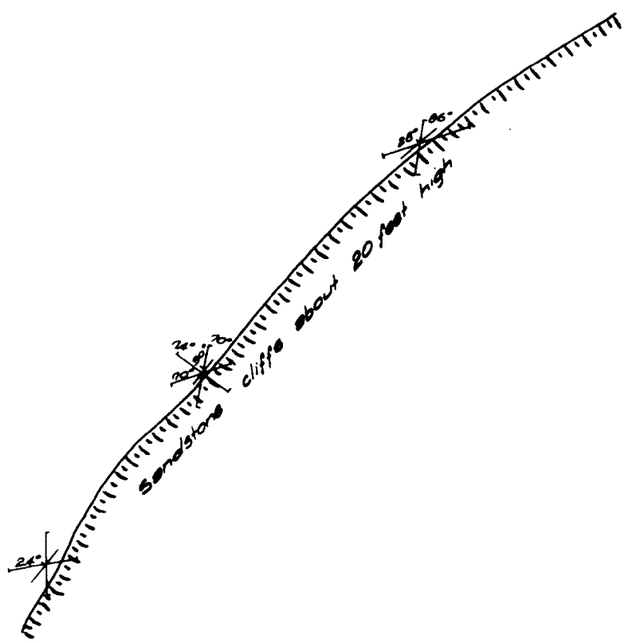
GML 27F

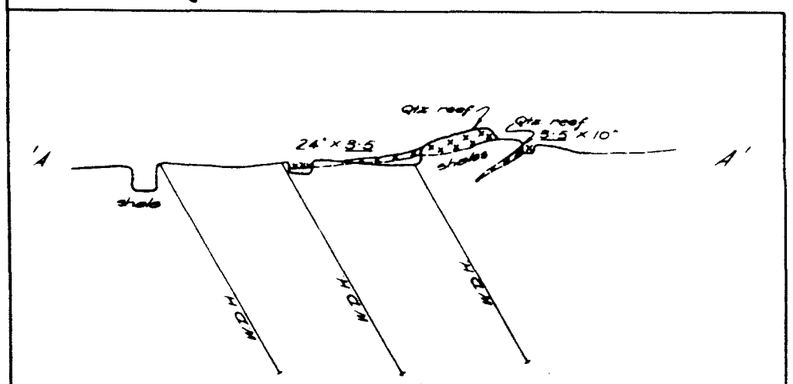
GREAT DAVENPORT GOLD PROSPECT

KURUNDI GOLDFIELD

SCALE

feet 10 0 40 80 120 160 200 feet

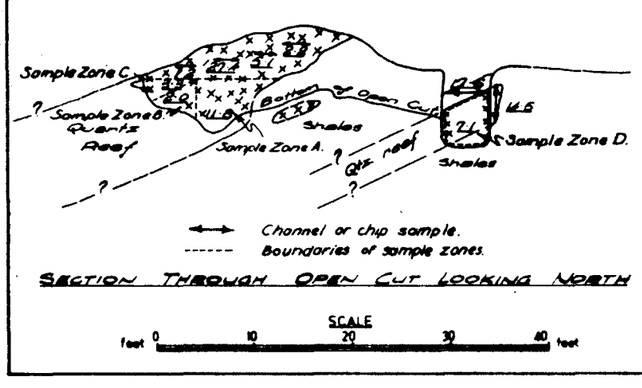




SECTION 'A-A' LOOKING NORTH

SCALE

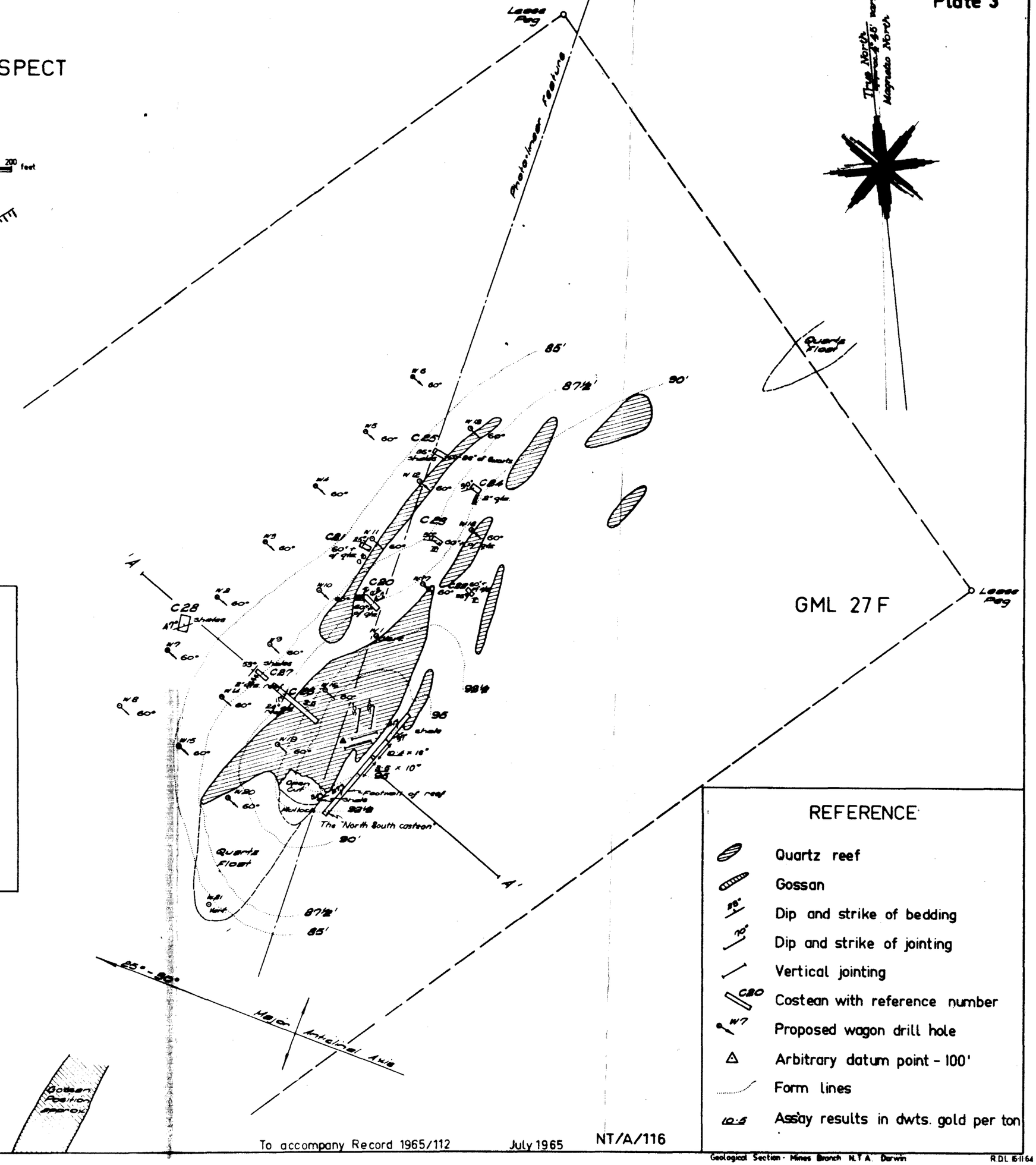
feet 0 40 80 120 feet



SECTION THROUGH OPEN CUT LOOKING NORTH

SCALE

feet 0 10 20 30 40 feet



GML 27F

REFERENCE

- Quartz reef
- Gossan
- 25° Dip and strike of bedding
- 70° Dip and strike of jointing
- Vertical jointing
- C20 Costean with reference number
- W7 Proposed wagon drill hole
- △ Arbitrary datum point - 100'
- Form lines
- 10·5 Assay results in dwts. gold per ton

To accompany Record 1965/112 July 1965 NT/A/116

Geological Section - Mines Branch N.T.A. Darwin R.D.L. 15-11-64