COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1967/127

REPORT ON MINOR METALLIFEROUS INVESTIGATIONS, TENNANT CREEK AREA, NORTHERN TERRITORY.

by

B.A. Tapp

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CONTENTS

Geological Report on the Power-of-Wealth Gold Mine, Kurundi, Gold Field, N.T.

REPORT ON INVESTIGATIONS CARRIED OUT ON BLUE MOON GOLD MINE No. 2 LODE

SUMMARY

Between January to February 1966, five diamond drill holes were put down on No. 2 Lode of the Blue Moon gold mine, Tennant Creek. Massive ironstones were intersected in drill holes DDH.2 and DDH.3; narrow intersections were made in DDH's 4 and 5. The ironstones were systematically sampled, but results were discouraging - 0.7 dwts of gold per ton being the highest recorded.

It was therefore concluded that No. 2 lode was composed of low grade material and warrants no further investigation.

INTRODUCTION

The Blue Moon leases are situated 18 miles from Tennant Creek on a bearing of 74° magnetic and are currently held by W.G. MacLean Esq.

The mine first came into production in 1935, and up to 1943, 3,288.38 tons of ore has been extracted at an average grade of 72 dwts/ton. In October 1953, a crushing was taken out by Mr. G.F. Graves totalling 69.76 tons at an average of 12.4 dwts/ton.

A further crushing was taken out in 1956, when 172.213 fine ozs of gold were obtained. Although it is known that the mine was intermittently worked until 1960, no other figures are available.

The whole of this production came from the main (No. 1) lode which is now completely worked out.

No. 2 lode occurs approximately 100 feet south-east of the main lode (see Plate 1).

The surface outcrop of this lode is approximately 140 feet long and 55 feet wide. At its east end, No. 5 shaft was sunk. The depth of this shaft is approximately 50 feet, the bottom 20 feet of which is water-filled.

GENERAL GEOLOGY

No. 2 lode is similar to the main No. 1 lode in composition and consists largely of micaceous, specular hematite intergrown with quartz. Minor constituents are limonitic jasper and partly replaced breccia containing angular fragments of sedimentary rocks enclosed by quartz hematite.

Other small hematite lodes are in evidence around No. 2 lode, but these appear to consist only of narrow lenses filling minor shear zones.

The country rock includes fine to medium grained hematitic sandstone with subordinate mudstone bands.

DRILLING RESULTS

Five drill holes were put down on this lode. Nos. 1, 2 and 3 were collared within the outcrop area of the lode to investigate its extension in depth: and Nos. 4 and 5 were sited to investigate its lateral extension to the north and south.

The following is a summary of the logs of these drill holes:

	Interval	Remarks	Assay Results
D.D.H.1			
Course Vertical	0' - 20'	Massive hematite	0' - 10' Nil. 10' - 20' 0.7 dwts/ton
Depth 103 feet	20' - 35'	Sheared snad brecciated sandstone	Nil
	25' - 83'	Banded mudstone	Nil
	83' - 103'	clayey mudstone	
D.D.H.2			
Course Vertical	0' - 46'	Massive hematite	0' - 10' 0.7 dwts/ton 10 - 20' Nil 20 - 30' Nil 30 - 40' Trace 40 - 46' Trace
Depth 102 feet			

b

	Interval	Remarks	Assay Results
D.D.H. 2 (Cont.)			
	46' - 48'	Kaolin and sericite-rich, shear zone	Nil
	48' - 102'	Mudstone	
D.D.H. 3			
Course Vertical	0' - 10'	Massive heamtite	Nil
	10' - 18'	Sandstone	Nil
Depth 51 feet	18' - 62'	Mainly kaolin and sericite (shear zone)	Nil
	62' - 86'	Sandstone and claystone	
D.D.H. 4			
Course Vertical	0' - 20'	Sandstone	Nil
	20' - 21'9"	Shear zone	Nil
Depth 51 feet	21'9"- 25'	Massive hematite	20' - 24' Trace
			24' - 30' "
	25' - 51'	Kaolin and sericite (shear zone)	Nil
D.D.H. 5			
Course Vertical	0' - 15'	Sandstone	Nil
	15' - 29'	Claystone	Nil
	29' - 42'	Kaolin and sericite (shear zone)	Nil
	42' - 52'	Claystone with hematite blebs	50 - 52' Nil
	52' - 55'	Claystone	Nil

A number of surface samples were also taken along the strike of the lode. The results however, revealed only low gold values; with a maximum of 0.4 dwts/ton.

CONCLUSIONS

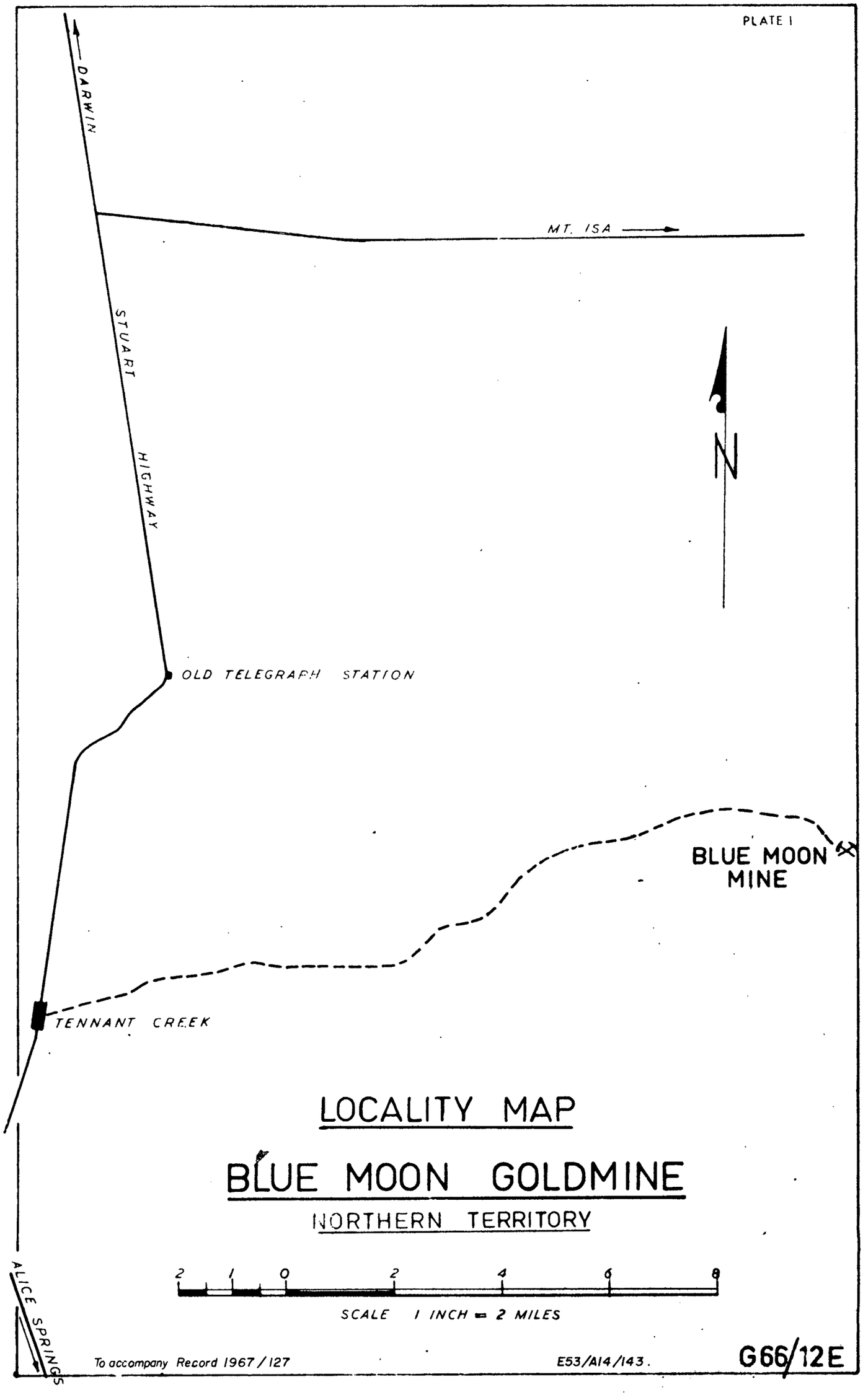
From the results obtained in the drill holes, the No. 2 lode appears to be a surface mat of ironstone localised by the intersection of a crush zone with a mudstone member in the sedimentary sequence.

The dimesnions of the lode are: length 140 feet, width 55 feet, maximum depth 50 feet. Assay results indicate that the lode ranges from 0.7 dwt/ton to a trace of gold. It is therefore concluded that the lode has no economic potential at the present time.

REFERENCE

IVANAC, J.F., 1954 - The Geology and Mineral Deposits of the Tennant Creek Gold Field, N.T. Bur. Min. Resour. Aust., Bull. 22.

PLATE I



LOCALITY MAP

BLUE MOON GOLDMINE

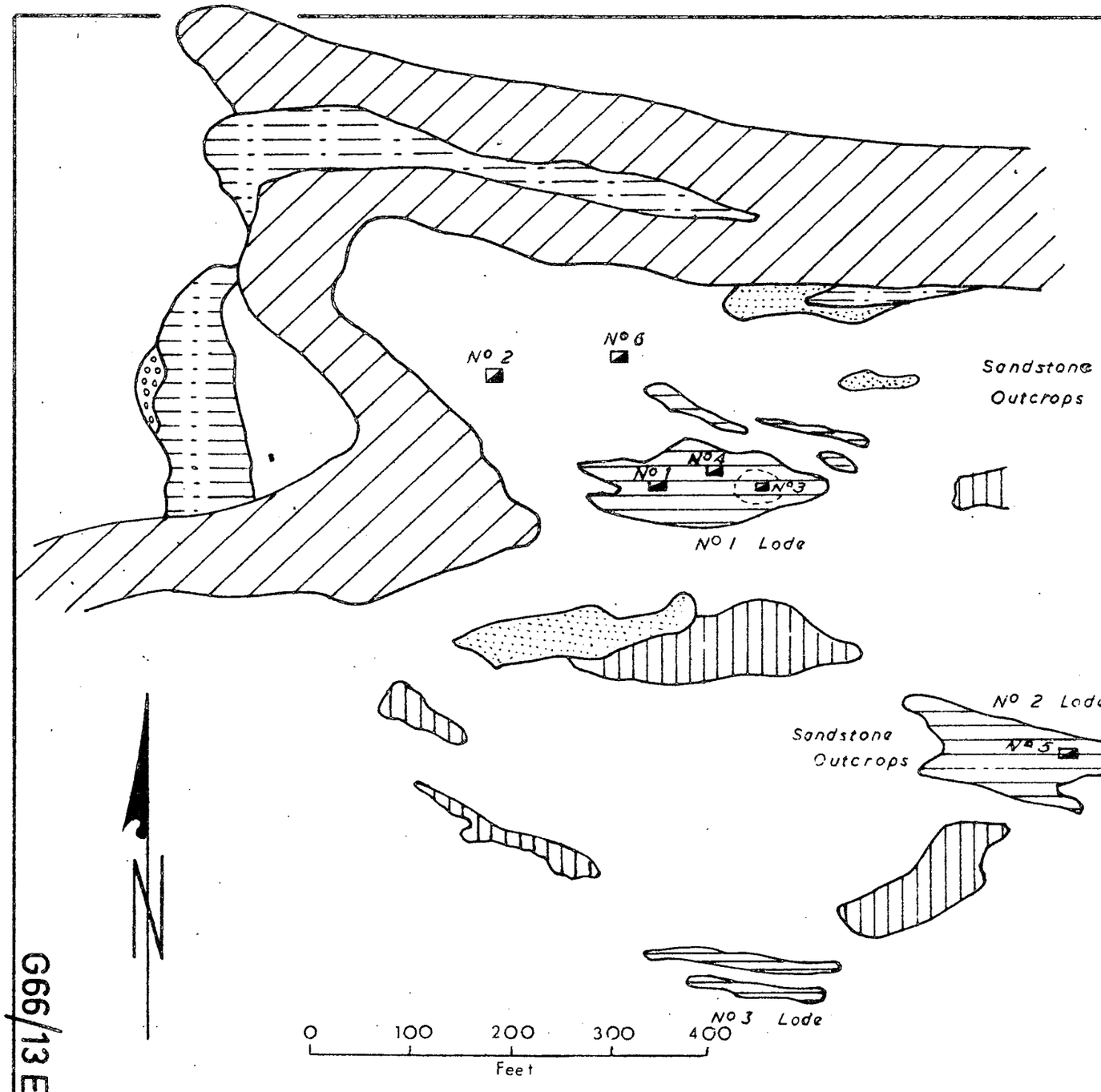
NORTHERN TERRITORY

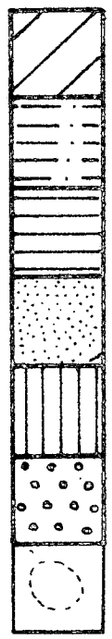
To accompany Record 1967/127

E53/A14/143.

G66/12E

PLATE 2





Sandstone

Mudstone

Ironstone

Cherty Slate

Haematite Shale

Breccia

Open Cut

GEOLOGICAL MAP
BLUE MOON GOLDMINE
NORTHERN TERRITORY

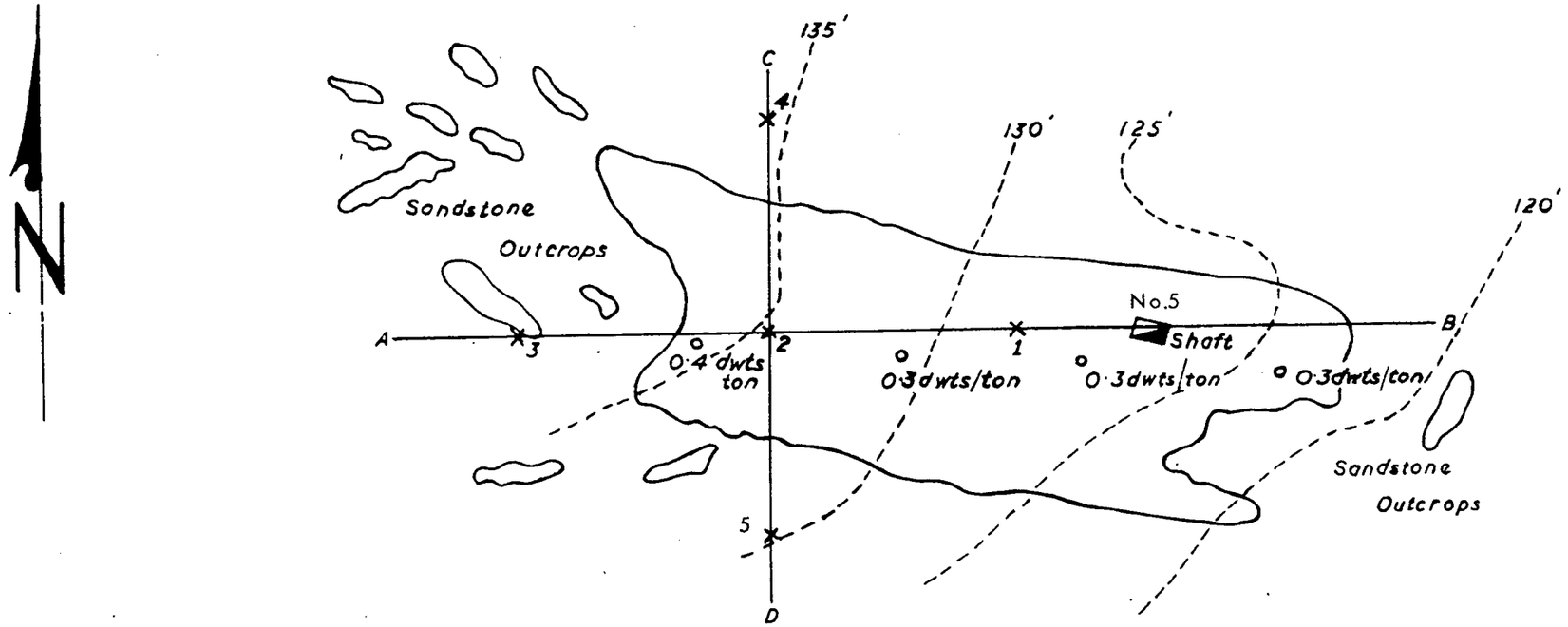
After Ivanac (1954), Plate 33

G66/13E

COMPILED BY RESIDENT GEOLOGICAL SECTION: DRAWN BY MINES BRANCH DRAUGHTING OFFICE DARWIN. AUGUST 1964.

To accompany Record 1967/127

E53/A14/144



LEGEND

- X — DRILL SITES: NUMBERS INDICATE ORDER IN WHICH DRILLED.
- O — ASSAY SAMPLE LOCATIONS, WITH RESULTS.
- IRONSTONE OUTCROPS
- A-B, C-D — LINE OF SECTION

DETAILED PLAN OF No. 2 LODE

BLUE MOON GOLDMINE

NORTHERN TERRITORY

0 40 80 120

Feet

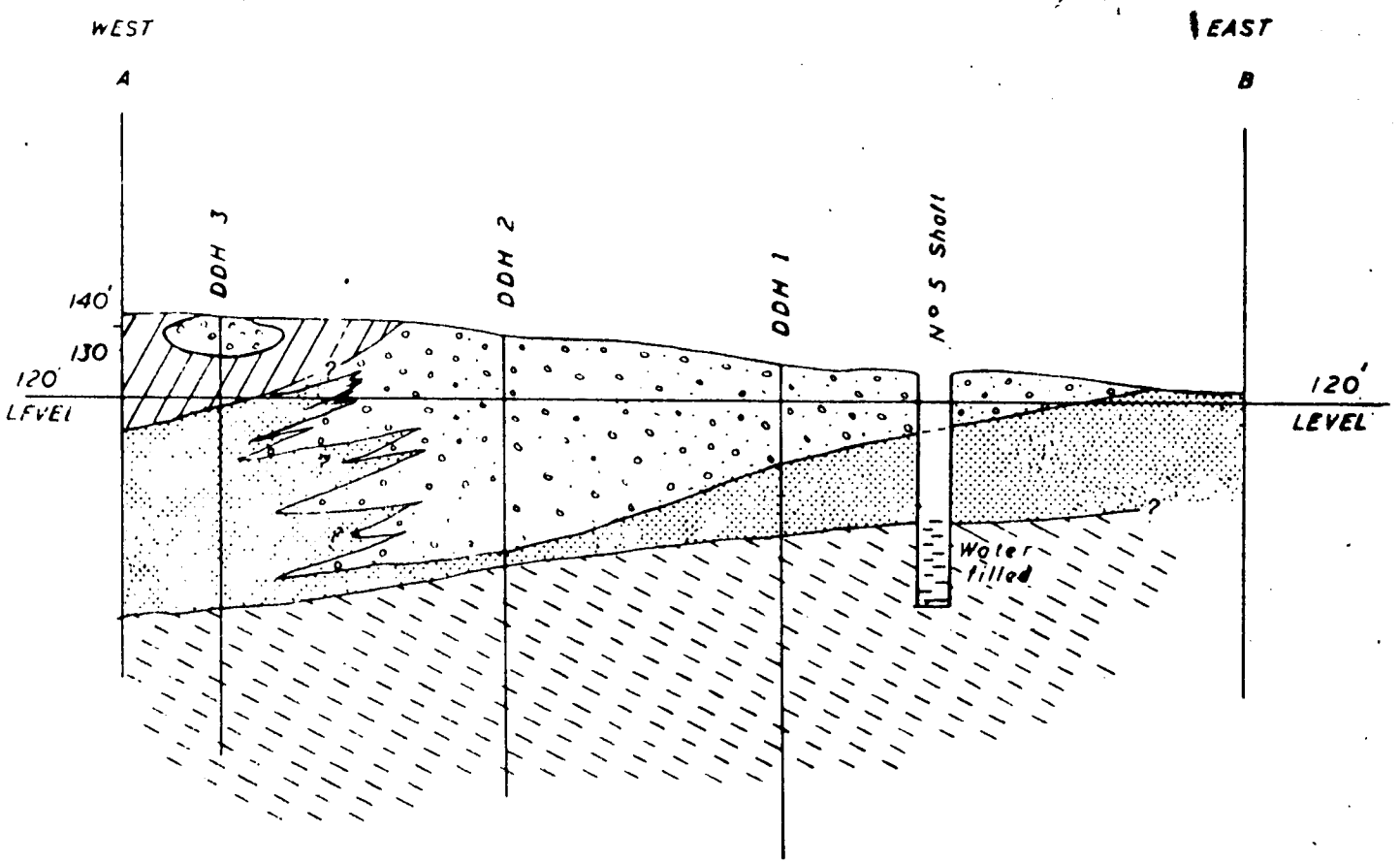
G66/14 E

To accompany Record 1967/127

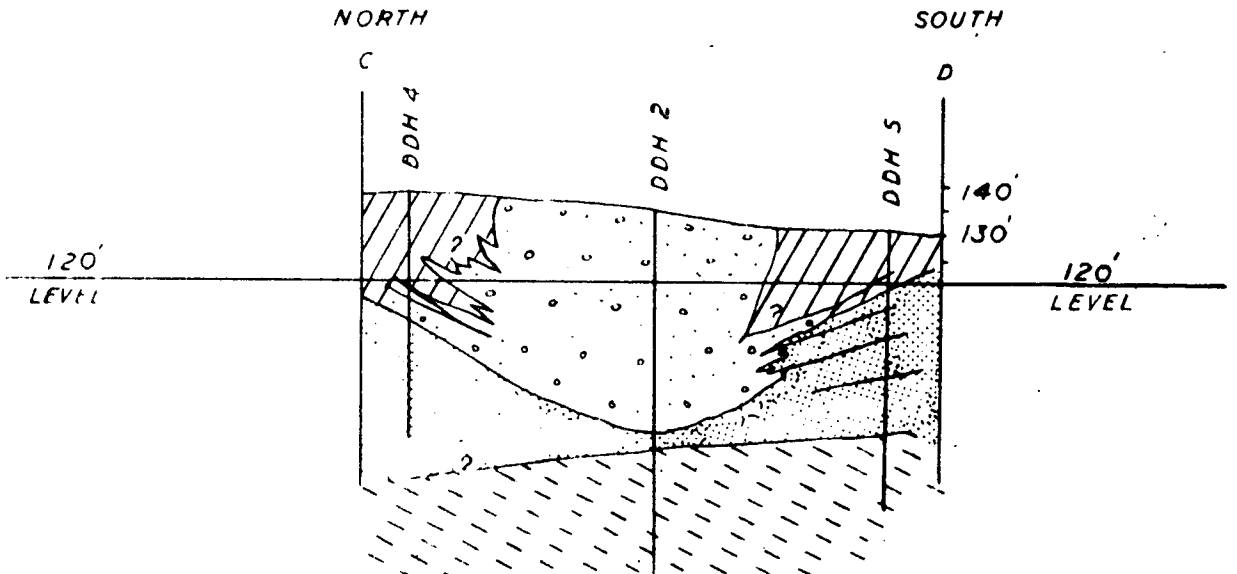
E53/A14/145

COMPILED BY THE RESIDENT GEOLOGICAL SECTION; DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN. AUGUST 1966.

PLATE 4



SECTION A-B



SECTION C-D

IRONSTONES

SANDSTONES

SHEAR ZONES

BANDED MUDSTONES

DIAGRAMMATIC SECTIONS OF N° 2 LODE BLUE MOON GOLDMINE

NORTHERN TERRITORY

0 40 80 120

Feet

COMPILED BY THE RESIDENT GEOLOGICAL SECTION.
DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, N.T. AUGUST 1966.

G66/15E

To accompany Record 1967/127

E53/A14/146

REPORT ON GEOLOGICAL INVESTIGATIONS AT THE HOPEFUL STAR GOLD MINE

SUMMARY

Up to 1952, the Hopeful Star Goldmine had produced 1,615.42 long tons of ore which returned 170.5 fine oz of gold by amalgamation, at an average grade of 2.1 dwts per ton.

The main workings are in sheared, iron-impregnated sedimentary rocks that strike approximately east, and form part of the northern limb of an anticlinal fold, the crest of which is exposed in a small costean about 200 feet south of the main workings.

Two 15-foot shafts and approximately 200 feet of drives constitute all the ezploratory and development work done on the lease.

A series of chip samples, channel samples and tailing samples have been taken at various points around the main workings; of these, one sample from the bottom of the shaft assayed 4.2 dwts/ton, and one from the spoil dump of the mine yielded 4.2 dwts/ton.

The drill hole results indicate that the Hopeful Star mineralization is restricted to a 'pod' which extends to a depth of less than 200 feet below the surface; the available information is insufficient to enable an estimate to be made of the available ore reserves.

INTRODUCTION

P.G. Dunn carried out a preliminary survey of the Hopeful Star lease during 1963, and concluded that available evidence dit not favour drilling. However, he considered that, if drilling was attempted, two holes be put down, each about 260 feet deep.

Following a further examination by P. Crohn, a programme of drilling was started in September 1965 under an agreement with the leaseholder. The first drill hole was collared 200 feet south of the main shaft

at an azimuth of 360° magnetic and a depression of 45°, and the second hole was drilled from a point 200 feet north of the main shaft at an azimuth of 180° and a depression of 55°.

GEOLOGY

The mine is situated on a prominent mesa which rises about 60 feet above the surrounding plain. The country rock is predominantly slaty, with some intercalated sandstone and shale bands. The mesa is formed by a resistant quartz-hematite-jasper lens which lies within the northern limb of a small anticline and is bounded to the south by a broad shear zone. Another, smaller shear zone and quartz-jasper-hematite lens occur north-west of the main mesa.

The sedimentary rocks consist predominantly of dull red finely jointed slates with intercalations of fine-grained, well sorted snadstone and shale. All of these rocks are distinctly ferruginous.

The general strike in the area is easterly, with dips generally between 40° and 60° to the north.

A band of dark red to mauve shale, four feet thick occurs in the core of the anticline, which is exposed in a small costean, 200 feet south of the mesa.

The southern flank of the mesa is composed of a vertical or steeply dipping shear zone, up to 40 feet wide, with an approximately easterly strike, roughly coincident with a major cleavage direction in the surrounding slates. The shear zone is composed of iron-impregnated kaolinised and sericitised slaty sediments, and most of the mine workings are found adjacent to this shear zone.

A jasper-quartz-hematite lens forms the northern portion of the mesa. The jasper content of this rock varies, but usually occurs in small blebs, from 2 to 3 inches in diameter. Locally it is associated with abundant quartz veins of variable thickness. Some of the hematite is specular.

PREVIOUS ASSAY RESULTS

Of seven samples tanken by P. Dunn in August 1963 and analysed at the Central Government Battery, one gave an assay of 1.9 dwts gold per ton, but the remainder gave a trace of gold only. Eight assays were also carried out on chip and channel samples taken from the bottom of the main shaft; one of these returned 4.2 dwts. gold per ton, but the remainder ranged from 0.3 to 0.8 dwts only.

In August 1965, nine grab samples were taken from the dump at the main shaft by Mr. D.L. Williams, of Tennant Creek, with the following results:

Sample 893	0.2 dwts/ton
894	trace
895	"
896	1.3 dwts/ton
897	0.3 "
898	trace
899	4.1 dwts/ton
900	0.2 "
19301	trace

DIAMOND DRILLING RESULTS

Drill hole D.D.H. 1 was sited to test the possible downward extension of the gold-bearing zone at the main shaft; D.D.H.2 was sited to furnish information on the extent of the associated quartz-hematite-jasper lens. Sparsely mineralized zones were intersected, but neither hole encountered a major zone of mineralization. The mineralized zone at the main shaft therefore appears to be restricted to a surface 'pod', as shown in Plate 3, extending to a depth of not more than 200 feet.

D.D.H. 1 Azimuth 360°(M), depressed at 45°.
Depth 474 feet.
Description: 0' - 474': Red slate with quartz and jasper stringers and blebs. Hematite abundant throughout core length, occasionally occurring as stringers, but mainly as blebs.

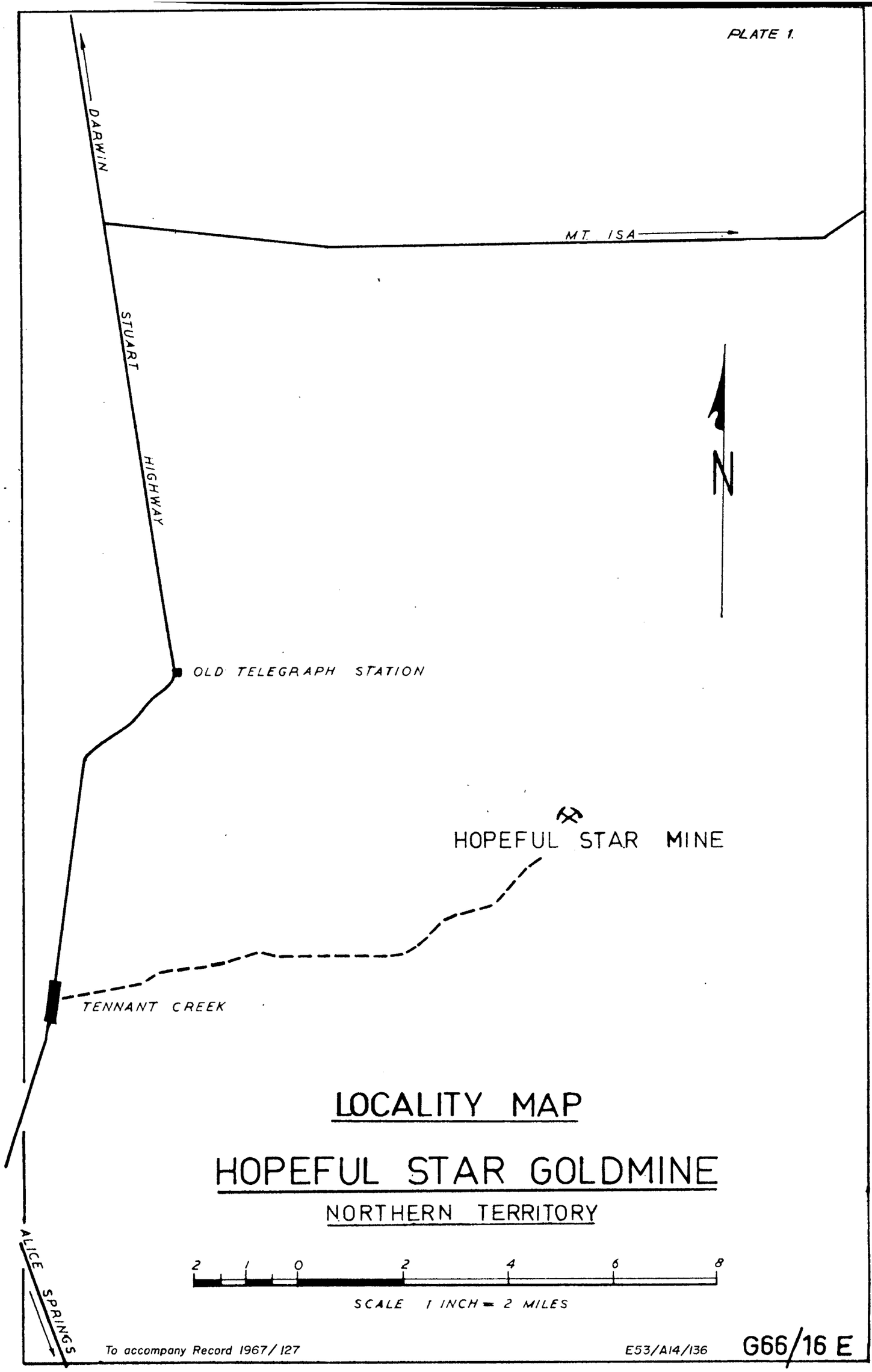
Assay Results:

309' - 316'	trace
316' - 320'	nil
320' - 321'	1.0 dwt
321' - 326'	nil
326' - 332'	trace
332' - 333'	1.0 dwt
338' - 344'	0.3 dwt
359' - 360'	nil
364' - 365'	nil
369' - 370'	nil
376' - 378'	nil
380' - 382'	nil
447' - 448'	nil
450' - 451'	nil

D.D.H. 2 Azimuth 180°(M), depressed at 55°.
Depth 365 feet
Description:

0' - 50'	Mudstone
50' - 72'	Slate
72' -121'	Sandstone
121' -173'	Mudstone
173' -232'	Sandstone
232' -242'	Mudstone with hematite blebs
242' -275'	Sandstone with occasional clay bands, some mudstone and hematite
275' -277'	Quartzitic sandstone
277' -278'	Brown clay band
278' -314'	Mudstone
314' -320'	Clay and banded mudstone
320' -365'	Mudstone with slaty bands

PLATE 1.



LOCALITY MAP

HOPEFUL STAR GOLDMINE

NORTHERN TERRITORY

2 1 0 2 4 6 8

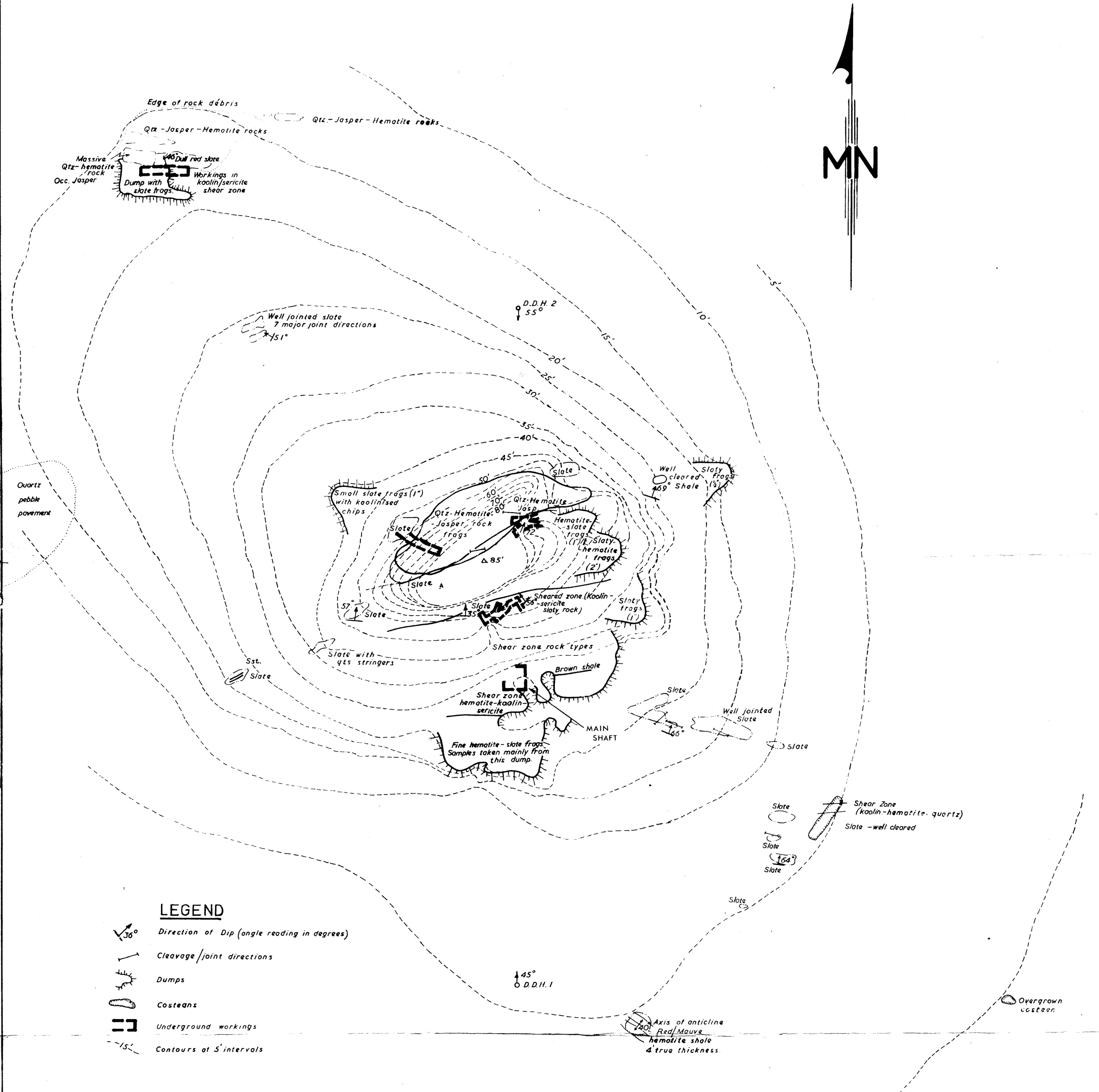
SCALE 1 INCH = 2 MILES

To accompany Record 1967/127

E53/A14/136

G66/16 E

PLATE 2



GEOLOGICAL MAP OF HOPEFUL STAR GOLDMINE

NORTHERN TERRITORY

SCALE

40 0 40 80 FT.

1 INCH = 40 FEET

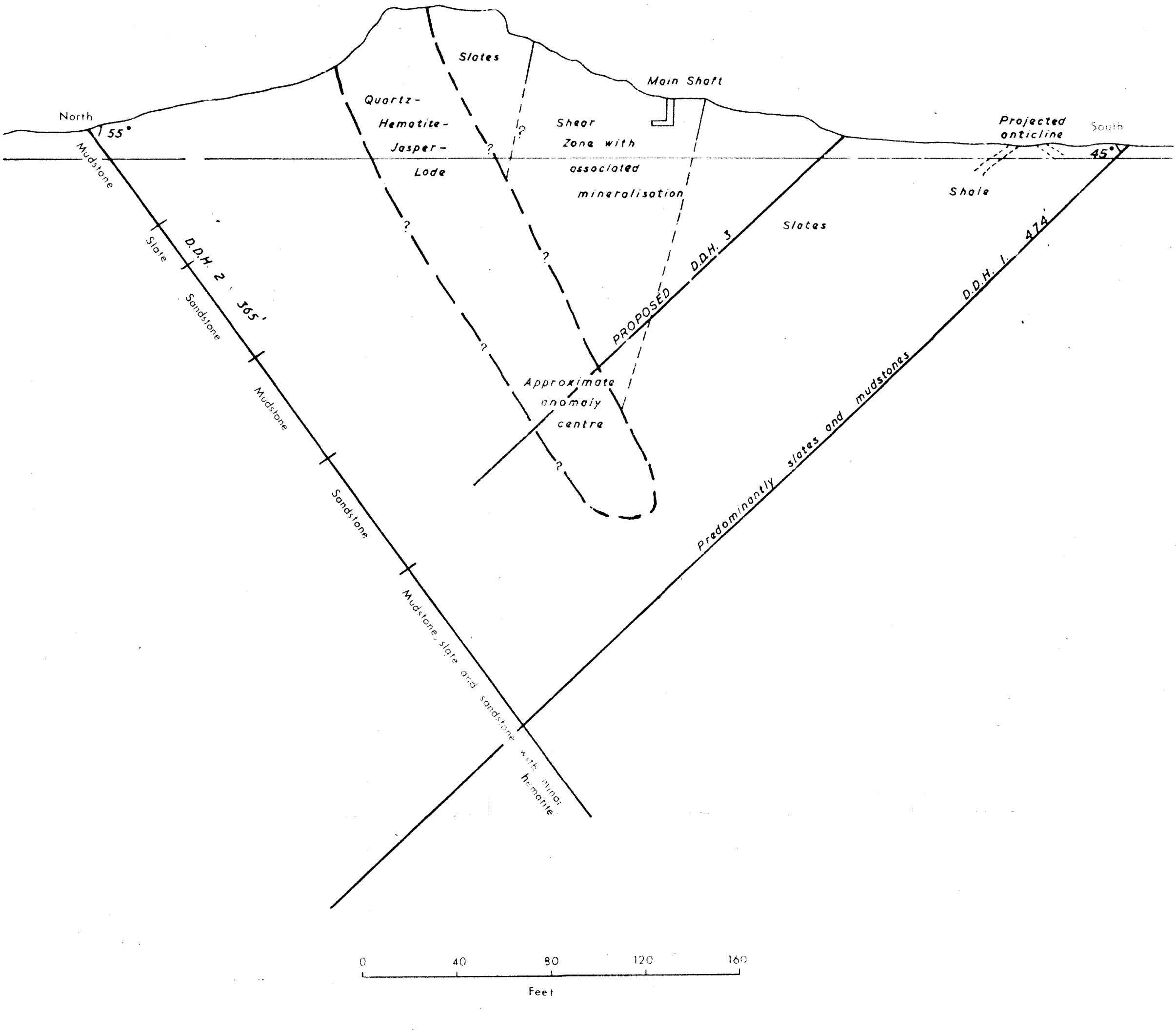
G66/17C

To accompany Record 1967/127

E53/A14/138

COMPILED BY RESIDENT GEOLOGICAL SECTION: DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, N.T. SEPTEMBER 1966

PLATE 5



SECTION THROUGH DIAMOND DRILL HOLES

HOPEFUL STAR GOLDMINE

NORTHERN TERRITORY

G66/18

To accompany Record 1967/127

E53/A14/137

COMPILED BY RESIDENT GEOLOGICAL SECTION: DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN. SEPTEMBER 1966.

Hematite found in stringers and blebs throughout core length.

Assay Results: Samples taken every five feet between
230' - 275' and
280' - 320' all results nil.

RECOMMENDATIONS

A slight magnetic anomaly occurring at this gold mine (Daly 1957, Plate 15) is comparable to that which would be caused by a magnetic body centred at a depth of 220 feet. The two completed drill holes were sited to pass under the mine workings at a slightly greater depth.

To investigate the mineralised zone at a shallower depth, and to penetrate the postulated centre of the anomaly, a third drill hole would therefore have to be drilled, collared 100 feet south of the main shaft, drilling on an azimuth of 360°(M) at a depression of 45°. However, in view of the disappointing results of D.D.H. 1 and 2, no high priority can be assigned to the drilling of this hole.

REFERENCES

DUNN, P.G., 1963 - Mines Branch, N.T. Administration. File note (unpublished).

DALY, J., 1957 - Magnetic Prospecting at Tennant Creek, N.T., 1955-1957. Bur. Min. Resour. Aust. Bull. 44.

PRELIMINARY SURVEY - SOUTHERN STAR AREA

SUMMARY

At the suggestion of J. Ivanac, a survey was carried out in the Southern Star area.

The relationship between the ironstone lodes and the intrusive porphyry body in this area shows many similarities to that in the Peko region.

The ironstone lodes in the Southern area, are localised within a folded and sheared belt, just north of a porphyry outcrop, and are thought to have a westerly pitch.

A ground magnetometer survey in this area indicated the presence of a feeble magnetic anomaly, and further magnetometer surveys are recommended to fully delineate this anomaly.

INTRODUCTION

The Southern Star group of prospects lies on the western portion of a chain of small hills, approximately one and a half miles south-east of the township of Tennant Creek, and two miles north of Eldorado Mine.

It has been suggested that the mineralized ironstone bodies in the Tennant Creek field may be related to porphyry intrusives, and there are many environmental similarities in the occurrence of the mineralized bodies in the Peko and Southern Star areas, as shown on the Tennant Creek One-mile Geological map (Crohn and Oldershaw, 1965). At the suggestion of J. Ivanac, a survey was therefore made of the Southern Star leases, to investigate possible lode extensions.

Recorded production from this group of prospects up to July 1952, (Ivanac, 1954) is as follows:

	Long tons	Fine ozs	Dwts/ton	Tailings
Southern Star East	133.89	83.00	12.38	8.0 dwts
Southern Star West	161.72	37.16	4.60	0.8 dwts

The prospects have not beet worked since 1952.

GENERAL GEOLOGY

In the Southern Star area a porphyry body outcrops as an east-west trending lens, and is faulted on its northern side. At the eastern and western extremities, this porphyry contains a number of slate inclusions, and it is associated with numerous small east-west quartz stringers, several of which are auriferous.

Just to the north of the porphyry, a zone of shearing closely associated with a series of east-west folds, has resulted in brecciation of the sedimentary rocks. This shear zone may be pre-intrusive, and may have controlled the localisation of the ironstone bodies, of which there are a large number within this sheared breccia zone. Near the porphyry contact many of these ironstone bodies are quartzose and jaspery, and carry only low gold values, whereas farther north, the ironstones appear to be localised by the intersections of shears and folds, and are markedly more massive. However, as at the Pinnacles, the mineralized zones in the Southern Star area are not typically within the ironstones, but are more often associated with the brecciated contact zones.

ECONOMIC GEOLOGY

Most of the gold won from the lease appears to have been in the form of shed gold, from the southern side of a small hill. Systematic loaming by the original lease-holders indicated the possibility of another gold shoot 300 feet west of this point. The loams were present to a depth of eight inches beneath the surface (W.A. MacDonald, Imspector of Mines - letter to the Director of Mines, 6.4.49).

At the eastern end of the lease, where most of the prospecting work had been done, an adit just intersected the eastern extremity of one of the ironstone lenses. The position of this intersection suggests a westerly pitch of the lens.

Samples from the ironstones contained up to 0.8 dwts/ton gold, and samples from the contact breccia zone contained up to 1.6 dwts/ton gold.

GROUND MAGNETIC SURVEY

In view of the favourable location of the ironstones, and their proximity to a porphyry intrusive, a magnetometer survey was carried out on the flat west of the old mine workings in the hope of locating an extension of the known shoots, in spite of the fact that the area immediately west of the Southern Star mine is characterised by a regional 'low' on the aeromagnetic map.

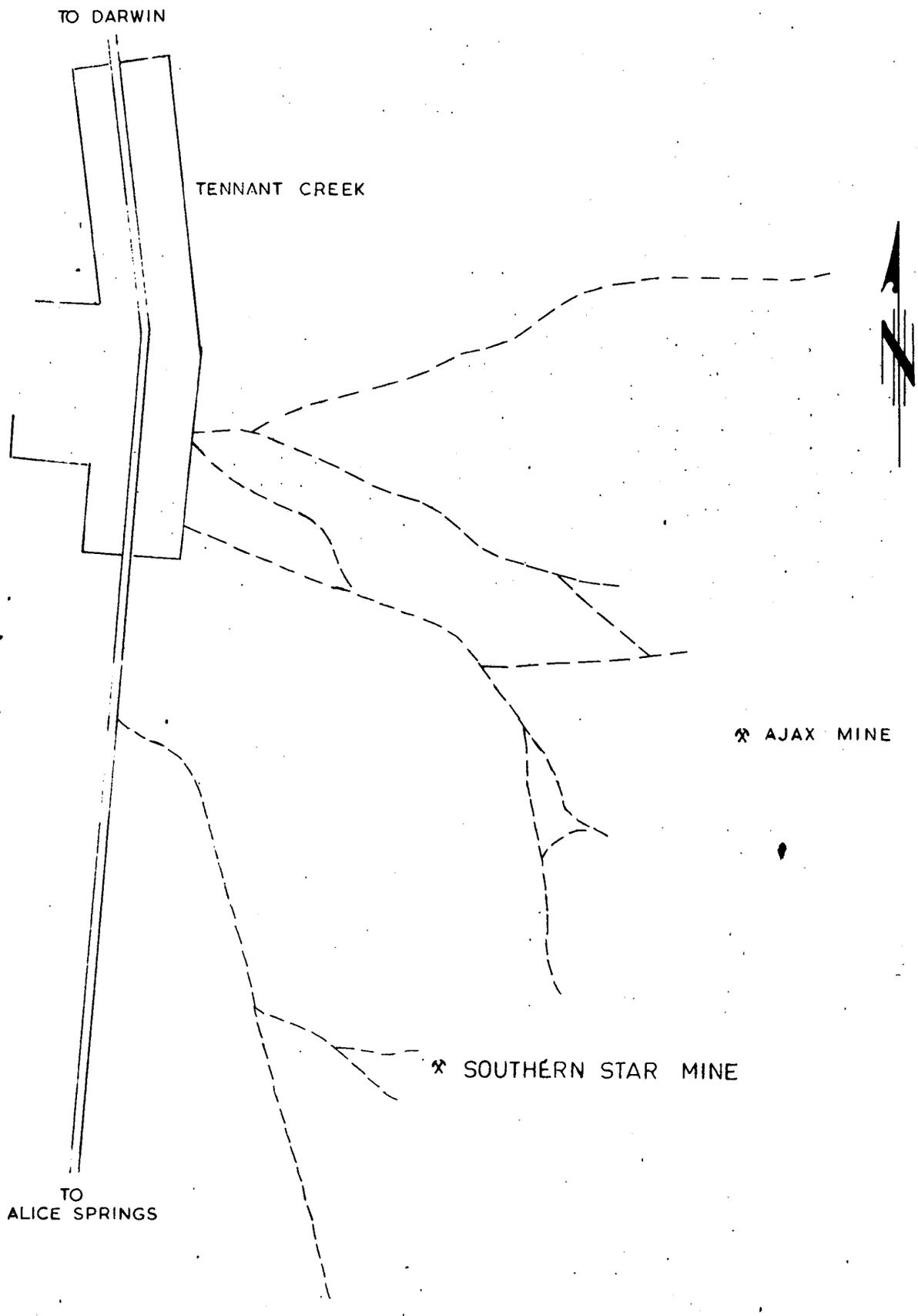
A 2100- foot base line was surveyed over the flats just west of the Southern Star workings; the base station, 00N, 00E, being located at a point bearing 80° magnetic from Mount Samuel beacon, and 136° magnetic from the Town beacon. The area was gridded at 100-foot intervals and readings were taken with an ABEM model 4 ground magnetometer, but the survey was not completed as the magnetometer was on loan for a brief period only.

A low amplitude elongated anomaly of 70 gammas was only partly outlined, but sufficient information was gained to conclude that the anomaly may be due to a westerly extension of the main Southern Star quartz-hematite lodes.

RECOMMENDATIONS

It is recommended that the base line be extended 2000 feet to the east, and that the magnetometer survey along the base line and along a series of selected north-south traverses be completed.

PLATE 1



LOCALITY MAP

SOUTHERN STAR MINE

NORTHERN TERRITORY

0 1000 2000 3000 4000

Approx. Feet

RESIDENT GEOLOGICAL SECTION
MINES BRANCH DRAUGHTING OFFICE, DARWIN. NOV. 1966.

G66/36E

To accompany Record 1967/127

E53/A14/147

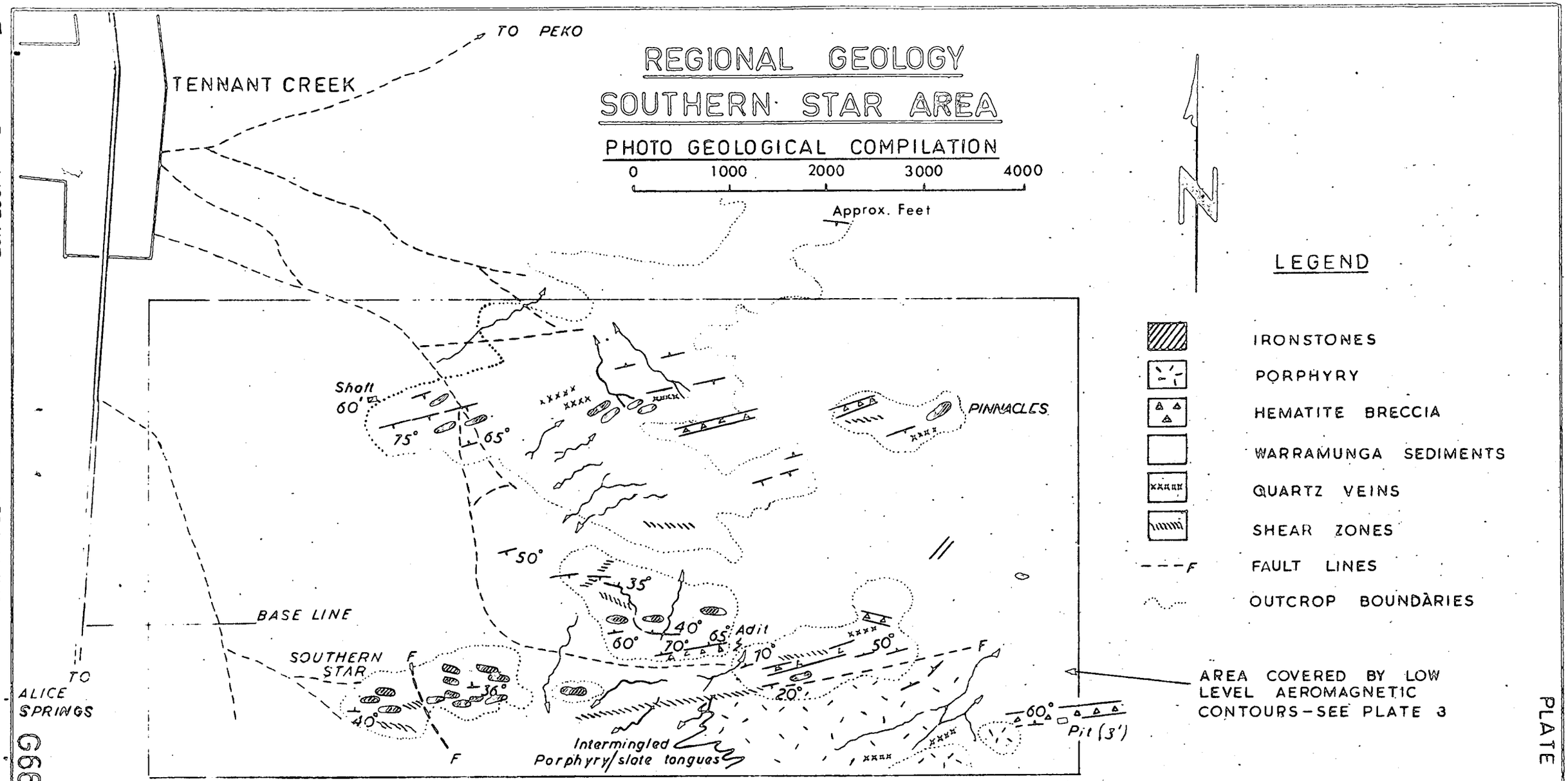
To accompany Record 1967/127

E53/A14/148

REGIONAL GEOLOGY
SOUTHERN STAR AREA
PHOTO GEOLOGICAL COMPILATION

0 1000 2000 3000 4000

Approx. Feet



LEGEND

- IRONSTONES
- PORPHYRY
- HEMATITE BRECCIA
- WARRAMUNGA SEDIMENTS
- QUARTZ VEINS
- SHEAR ZONES
- F FAULT LINES
- OUTCROP BOUNDARIES

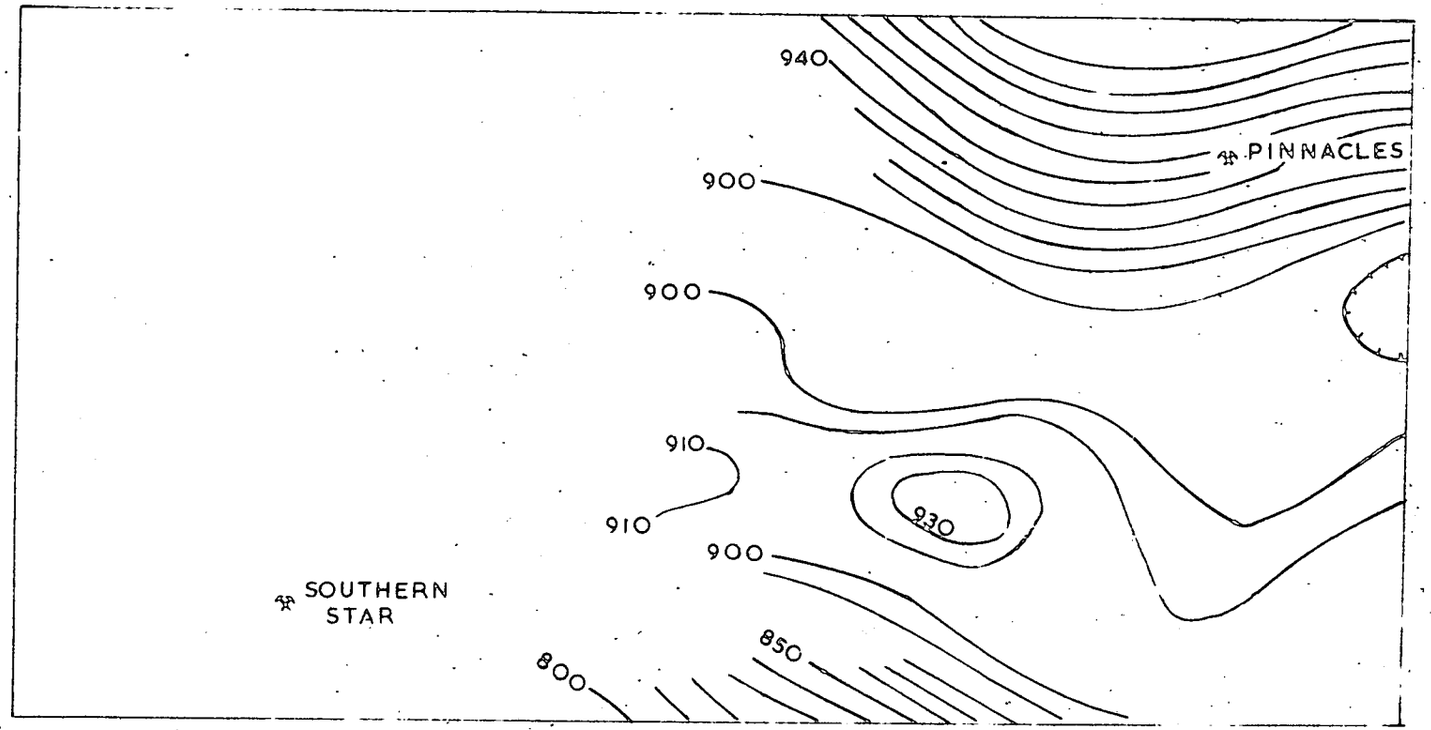
AREA COVERED BY LOW LEVEL AEROMAGNETIC CONTOURS – SEE PLATE 3

PLATE 2

COMPILED BY THE RESIDENT GEOLOGICAL SECTION ; DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, N.T. NOV. 1966.

G66/373

22



SOUTHERN STAR AREA

LOW LEVEL AEROMAGNETIC CONTOURS

CONTOUR INTERVAL 10 GAMMAS

0 1000 2000 3000 4000

Approx. Feet

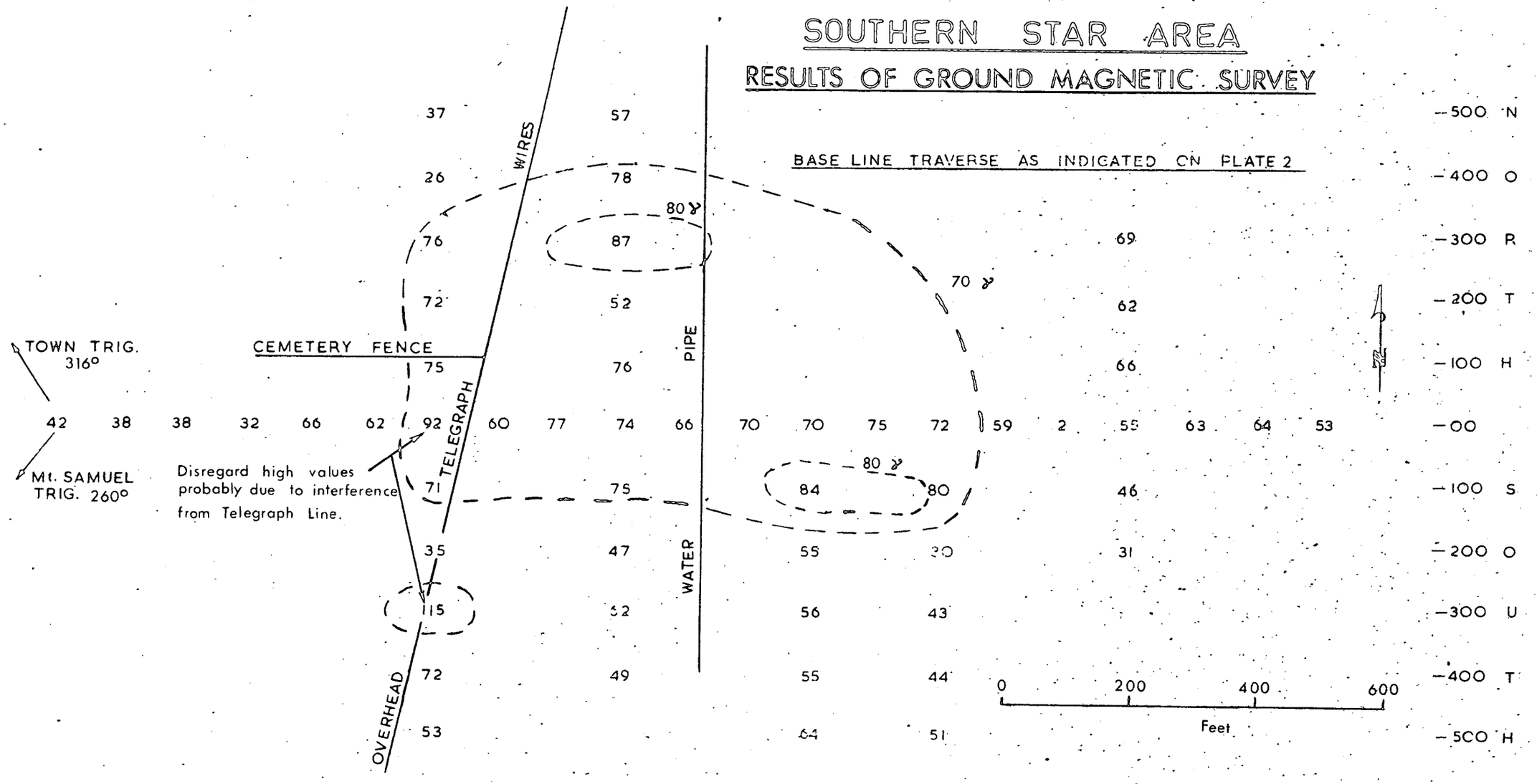
COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, N.T. NOV. 1966.

PLATE 3

To accompany Record 1967/104

SOUTHERN STAR AREA

RESULTS OF GROUND MAGNETIC SURVEY



COMPILED BY THE RESIDENT GEOLOGICAL SECTION: DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, N.T. NOV. 1966.

E53/A14/150 G66/39E

PLATE 4

If these additional magnetometer surveys indicate areas of specific interest, further testing by wagon drilling or diamond drilling may be warranted.

REFERENCES

IVANAC, J.F., 1954 - The Geology and Mineral Deposits of the Tennant Creek Goldfield, N.T. Bur. Min. Resour. Aust. Bull. 22.

CROHN, P.W. and OLDERSHAW, W., 1965 - The Geology of the Tennant Creek one-mile Sheet area, N.T. Bur. Miner. Resour. Aust. Rep. 83

PRELIMINARY GEOLOGICAL REPORT ON THE PERSEVERANCE MINE, TENNANT CREEK

SUMMARY

At the request of the Lessees a ground magnetic survey was made of the Perseverence Mine and part of the surrounding area. Previous investigations had revealed that bismuth ore occurs in small rich patches, but that copper and gold values are low.

The ironstone bodies are largely siliceous and jaspery and seem to be emplaced in the crestal region of a west-pitching fold.

The magnetic survey revealed a 5,000 gamma anomaly, but this may be partly due to near-surface effects. When interpretation of the results is complete, recommendations for further work may be made.

INTRODUCTION

At the request of the Lessees Messrs K. Shirley & F. Drew, a ground magnetic survey was made of the Perseverence Mine and the Perseverence Extended Lease.

The mine is situated 20 miles east of Tennant Creek township in an area known as the Golden Mile. Access to the mine by way of Peko, Kiaora, Renate and Golden Mile Mines.

The mine has not been worked for a consdierable time. According to official records listed by Ivanac (1954), 192 ounces of gold were won from the mine up to June, 1952.

Towards the end of the 1950's the mine was worked for bismuth, but no production records are available.

The mine was sampled for bismuth by J. Barclay (1963) who recorded values ranging from 0.62% to 5.45% bismuth.

The ironstones were also sampled and geochemically investigated by R.R. Harding and D. Dunnet (1965), who recorded 40 ppm copper and 500 ppm bismuth in one sample.

GENERAL GEOLOGY

The quartz-hematite and jasper-hematite lodes outcrop as irregularly shaped bodies in cleaved and folded sedimentary rocks of the Warramunga Group. These sedimentary rocks are predominantly shale, siltstone, mudstone and sandstone, and possess a well defined east-west cleavage. The ironstone lodes are mostly elongated parallel to this cleavage and in places occur in groups, probably aligned parallel to the bedding of the surrounding sedimentary rocks.

The only outcrops in the immediate vicinity of the mine consist of quartz hematite bodies with sporadic bismuth mineralization. To the north of the mine, a sequence of sandstones and mudstones are exposed, including a bed of hematite shale approximately 10 feet thick.

J. Barclay stated (1963) "In the shaft at a depth of 25 feet from the surface, a contact between iron impregnated brecciated mudstone and massive quartz hematite pitches to the west. Relict bedding in the shaft strikes approximately north-south and dips to the west at 25°".

ECONOMIC GEOLOGY

Up to June, 1952, 192 ounces of gold had been won from the mine. Later work concentrated upon the mining of bismuth ore, but no production figures are available.

A description of the Mine given by J. Barclay (1963) is as follows:- "The walls of the shaft are timbered to a depth of 14 feet below which are exposures of iron impregnated, brecciated mudstone. At a depth of 25 feet from the surface and underlying the brecciated mudstone, is a body of massive quartz hematite. The sharply defined contact strikes at 330°, dipping 25° to the west. The workings at the 25-foot level apparently were made to test the hanging wall contact zone.

Bismuth ? carbonate in the ironstone is exposed near the bottom of the shaft and near the small chamber at the 48-foot level. The bismuth ore has a white, spotted appearance in irregular brecciated zones within the well-jointed massive quartz-hematite.

Four samples of the ore were taken, and assay results showed a range in values of from 0.62% to 5.45% bismuth and from nil to 0.5 penny-weights of gold per ton".

GEOPHYSICS

A magnetic anomaly of 5000 gamma intensity has been delineated in an area of ironstone outcrops approximately 1,200 feet west of the mine, but this may be partly due to near-surface effects.

CONCLUSIONS AND RECOMMENDATIONS

Previous surveys have shown that patchy high bismuth values occur in the mine, but the available information is insufficient to estimate probable reserves. If analysis of the magnetic data suggests the presence of a substantial ironstone body in a position consistent with the postulated pitch of the lode worked in the existing mine, a diamond drilling programme may be warranted to test this.

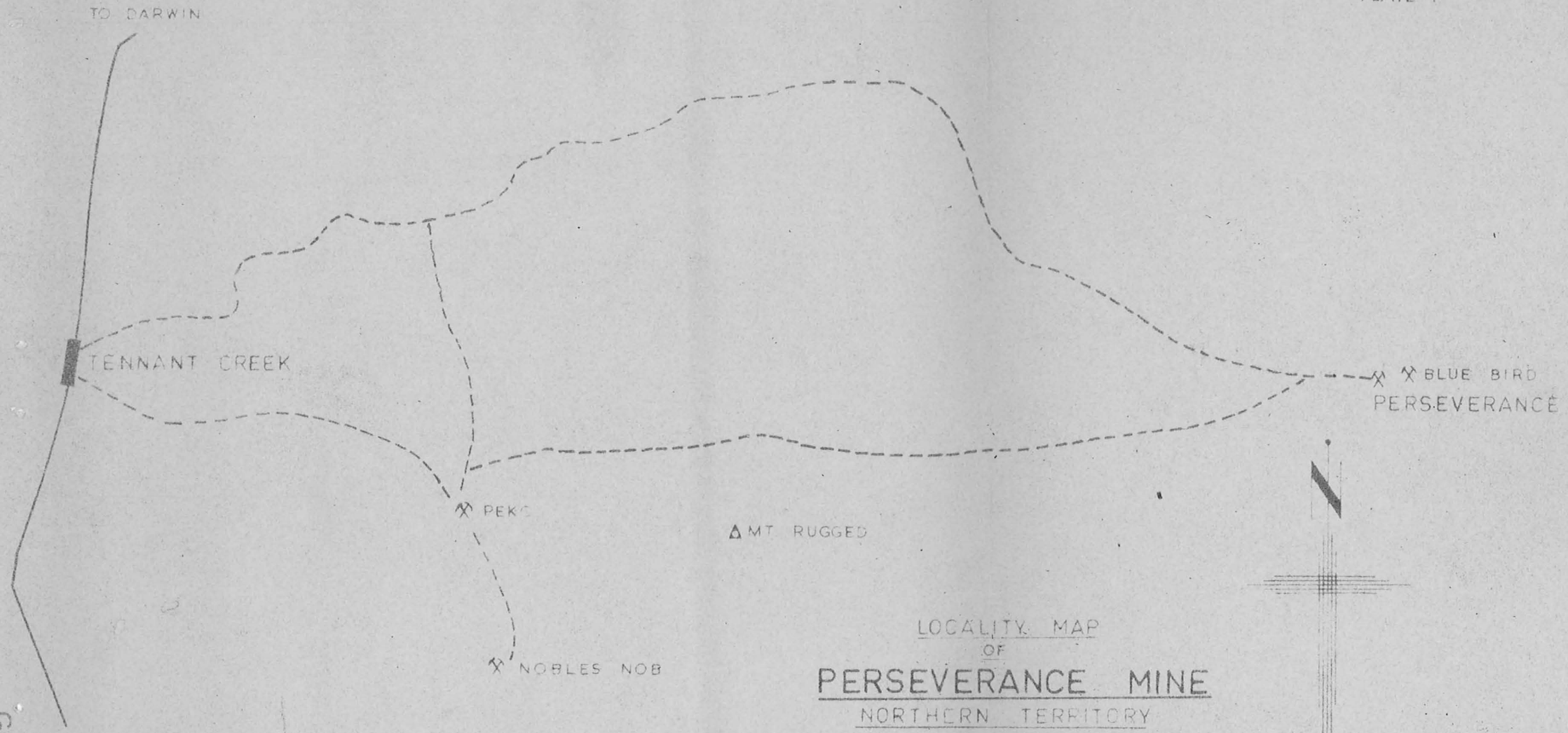
REFERENCES

BARCLAY, J., 1963 - Geological survey and sampling for bismuth at the Perseverence Mine, Tennant Creek. In Minor Metalliferous Investigations, Northern Territory Resident Geological Section. Bur. Min. Resour. Aust. Rec. 1963/3.

HARDING, R.R. and DUNNET, D., 1965 - Geochemical sampling of the Golden Mile and Jubilee areas, Teenant Creek. Bur. Min. Resour. Aust. Rec. 1965/143.

IVANAC, J.F., 1954 - The Geology and mineral deposits of the Tennant Creek, Gold Field, N.T. Bur. Min. Resour. Aust. Bull. 22.

PLATE 1



LOCALITY MAP
OF
PERSEVERANCE MINE
NORTHERN TERRITORY

0 2 4 6
Approx. Miles

G66/43E

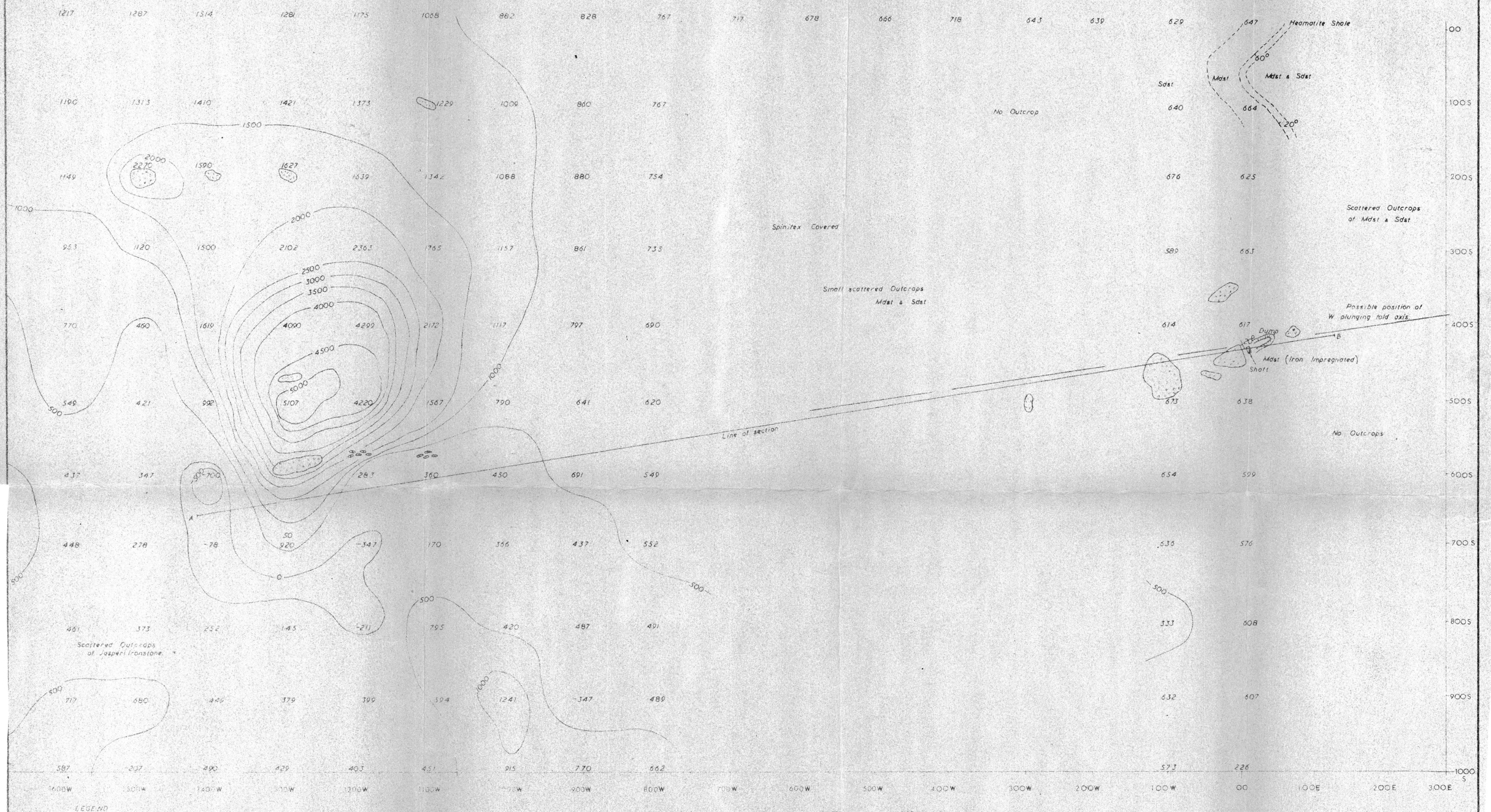
To accompany Record 1967/127

E53/A14/151

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DRAUGHTING OFFICE DEC' 1966.

PLATE 1

PLATE 2



LEGEND

Massive Siliceous Ironstone

Jaspery Ironstone

-500 Contours in Gammas

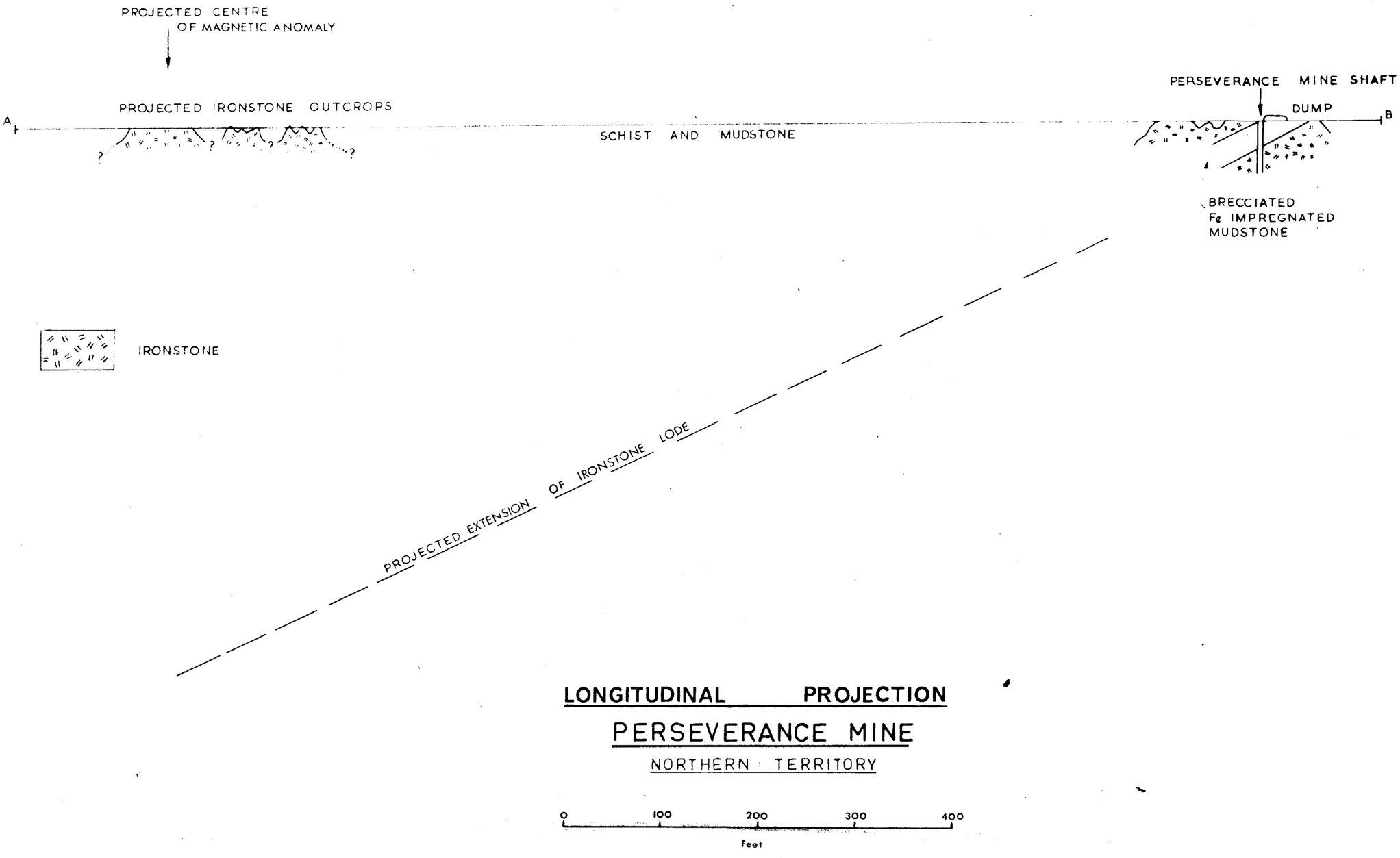
MAGNETIC ANOMALY
PERSEVERANCE MINE
NORTHERN TERRITORY

To accompany Record 1967/127

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DRAUGHTING OFFICE DARWIN - DEC 1966

E53/A14/152

G66/44C



LONGITUDINAL PROJECTION

PERSEVERANCE MINE

NORTHERN TERRITORY

0 100 200 300 400

Feet

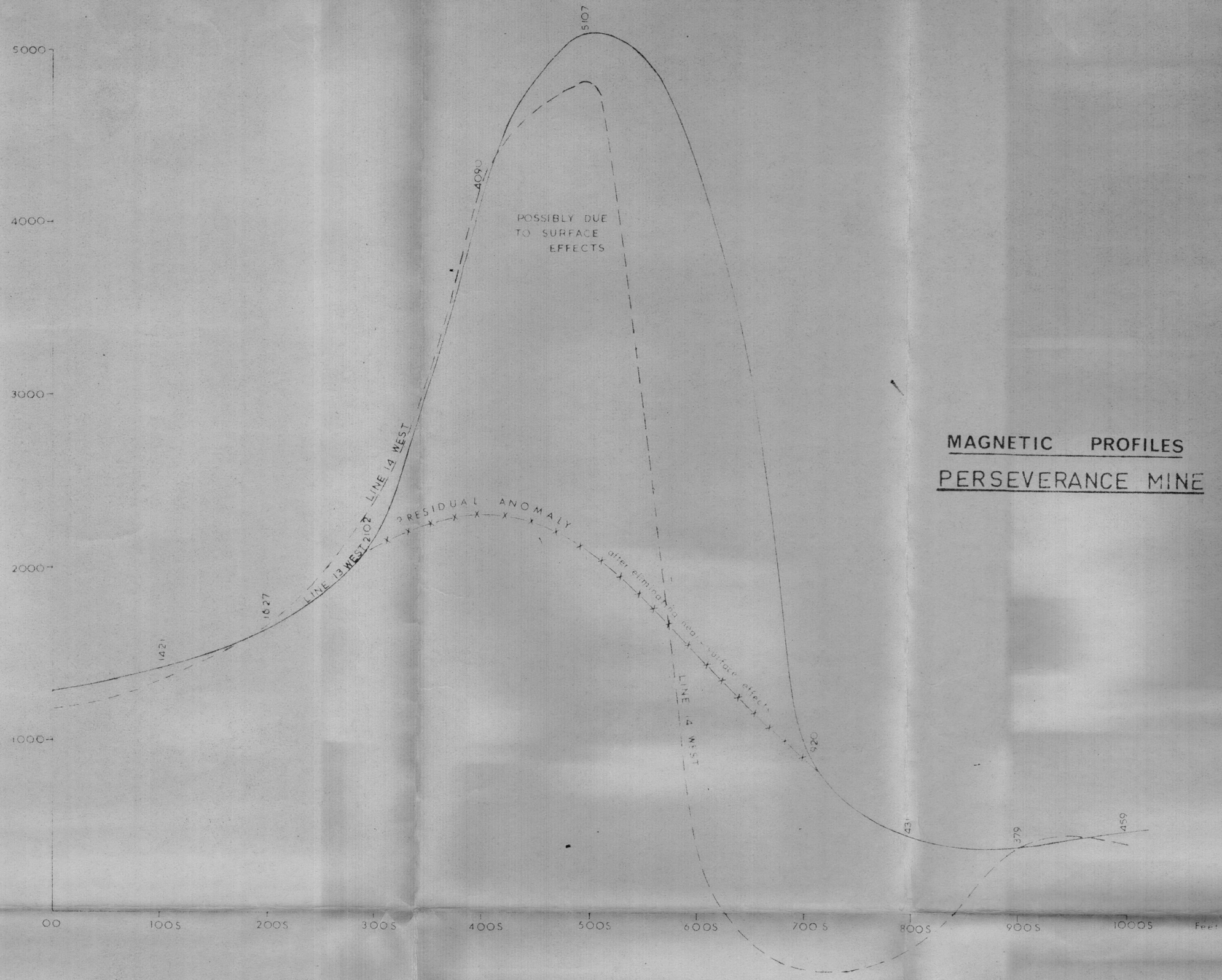
To accompany Record 1967/127

E53/A14/153

COMPILED BY RESIDENT GEOLOGICAL SECTION – DRAWN BY MINES BRANCH DRAUGHTING OFFICE DARWIN DEC' 1966

G66/45D.

PLATE 4



MAGNETIC PROFILES

PERSEVERANCE MINE

SCALE : VERTICAL 1" = 500 γ

HORIZONTAL 1" = 80'

To accompany Record 1967/127

E53/A14/154

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DRAUGHTING OFFICE DARWIN DEC 1966

G66/46D

GEOLOGICAL REPORT ON THE BULL PUP MINE, LAST HOPE AREA. TENNANT CREEK

SUMMARY

The Bull Pup Mine lies in an area known as the Last Hope Alluvials, approximately 30 miles north-west of Tennant Creek township.

The mine is situated on a small fault close to the crest of a small anticline. Development work by the lessee has returned twenty tons of ore which yielded 5½ ounces of gold.

The underground workings of the mine were mapped, and the ironstone and quartz veins were sampled, but no gold or copper values were recorded.

INTRODUCTION

The Bull Pup Mine is situated approximately 30 miles from Tennant Creek township on a true bearing of 315°. The lease is reached by travelling along the bitumen road to the Orlando mine, and thence by bush track for 15 miles in a westerly direction.

The mine lies within an area known as the Last Hope Alluvials (Moonlight Rock Hole), and is situated half a mile east of the Last Hope Mine.

At the request of the lessee, Mr. M. Stolges, a rapid geological survey was made of the mine workings.

Mr. Stolges' interest in this area was first aroused by his finding an "alluvial" sample containing approximately 20 ounces per ton of gold, (J. Edwards, Manager, Tennant Creek, Government Battery, pers. comm.). At the time of writing (November, 1966) the only crushing from the mine consisted of 20.7 tons of ore which yielded 5 ounces 6 dwts of gold.

GENERAL GEOLOGY

J. Ivanac (1954, pp. 19-20) states that the Ashburton Sandstone, (now known as the Tomkinson Creek Beds) conformably overlies the Warramunga Group sediments, and predates the Tennant Creek mineralization, but Dunnet and Harding (1965, p. 38) believe that the Tomkinson Creek Beds rest with an angular unconformity upon the granites and sediments of the Warramunga Group.

The Tomkinson Creek Beds are predominantly arenaceous in character, consisting of sandstones and quartzites; whereas the Warramunga sediments are mainly fine grained argillites and phyllites.

Approximately two miles north-west of the Last Hope Mine, a Mines Branch drill hole on the Explorer 27 prospect passed through a series of fine grained siliceous phyllites, which W.S. Yeaman (Resident Geologist, Tennant Creek, 1964/5), regarded as representing a transitional zone between the Warramunga and Tomkinson Creek Beds.

The Tomkinson Creek Beds strike predominantly east-west, but towards the western part of the Marion Ross one-mile sheet (in the vicinity of 123500E, 2566500N) the strike changes to a north-south direction with gentle westerly dips. Here the contact between the Tomkinson Creek Beds and the Warramunga sediments, which strike predominantly east-west, is nearly a right-angle unconformity. Further east the southern margin of the Tomkinson Creek Beds abuts against different stratigraphic members of the Warramunga Group, which also suggests that the Warramunga Group/Tomkinson Creek Beds contact is an unconformity.

In the Last Hope area, the Tomkinson Creek Beds are folded about east-west axes which plunge gently east.

Just north of the Last Hope mine a fault striking 095° coincides with the Tomkinson Creek/Warramunga contact. This fault post-dates the folding.

At the same locality a north-east trending lineament, possibly a fault, appears to displace the contact by a quarter of a mile.

SUBSURFACE GEOLOGY

Plates 3 and 4 show details of the underground workings.

The dominant rock types in the mine area are sandstones with occasional shale horizons, and kaolinised shear zones. The sandstones are fine to medium grained, often cut by thin quartz veins and show average dips between 20° and 50°.

Three shafts have been sunk near the trace of a small fault, close to the crest of a small anticlinal fold, which pitches gently east. This fault dips steeply to the north, and the sedimentary rocks in the immediate vicinity have been sheared, kaolinsed and silicified.

Gold is associated with ironstone and quartz stringers between 6 inches and 18 inches thick, which branch off from both sides of the fault zone.

The lessee obtained 20.7 tons of ore, yielding 5½ ounces of gold from a small northerly cross-cut in which the gold was associated with a quartz leader. The ironstones are crumbly and well weahtered, and carry only trace values of gold.

CONCLUSIONS

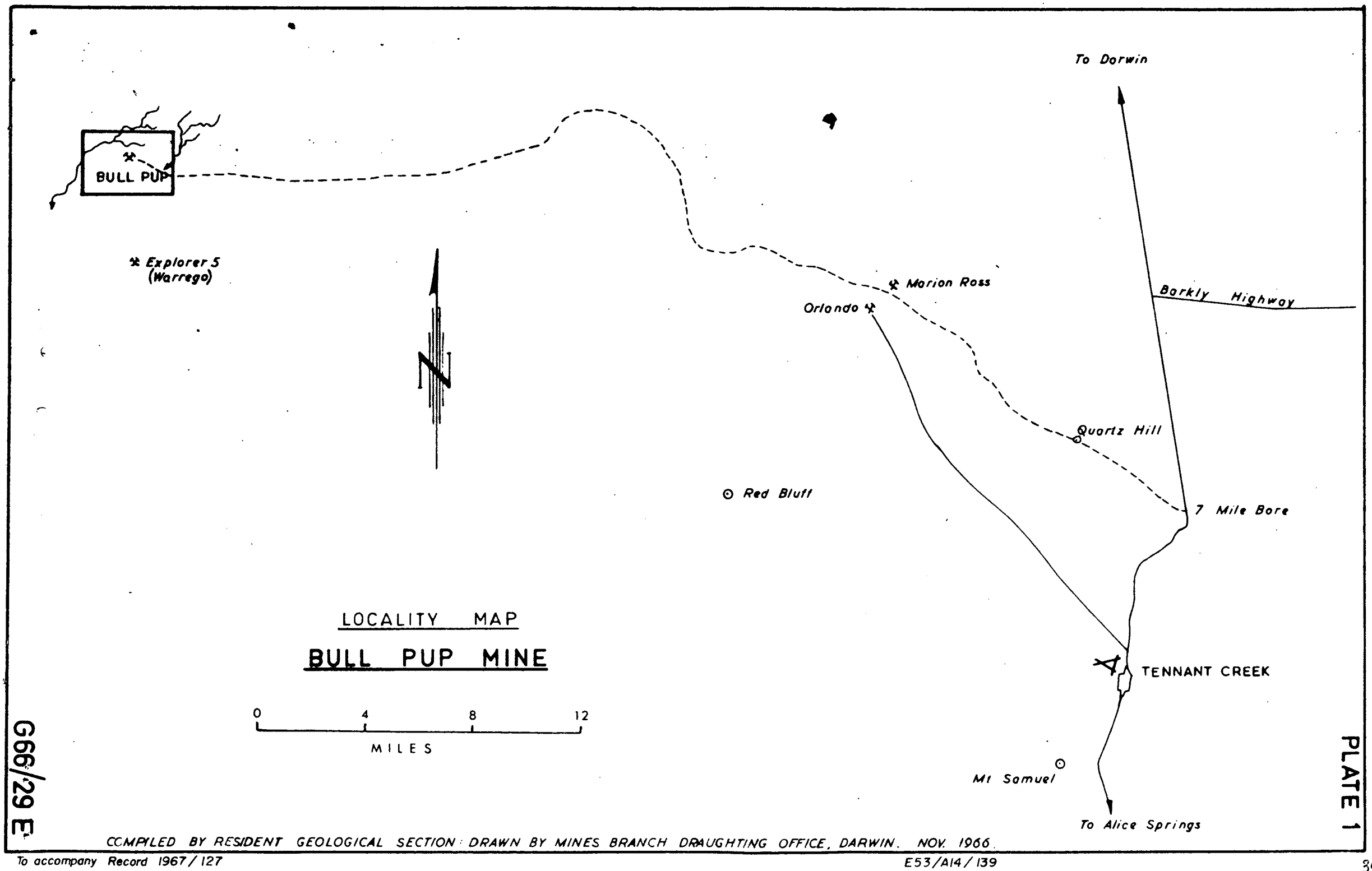
It is thought unlikely that payable quantities of ore will be found because of the limited width (6 inches to 18 inches) of the ironstone and quartz leaders, combined with their tendency to die out at a short distance from the fault zone, and because sandstone is not usually a favourable host rock to mineralization in the Tennant Creek field.

If, however, the lessee intends to continue development work on the mine, a more detailed geological survey is recommended.

REFERENCES

DUNNET, D. and HARDING, R.R., 1965 - The geology of the Mount Woodcock one-mile Sheet area, Tennant Creek, N.T. Bur. Miner. Resour. Aust. Rec. 1965/168.

IVANAC, J.F., 1954 - The Geology and Mineral Deposits of the Tennant Creek Gold Field, N.T. Bur. Miner. Resour. Aust. Bull. 22.



G66/29 E

PLATE 1

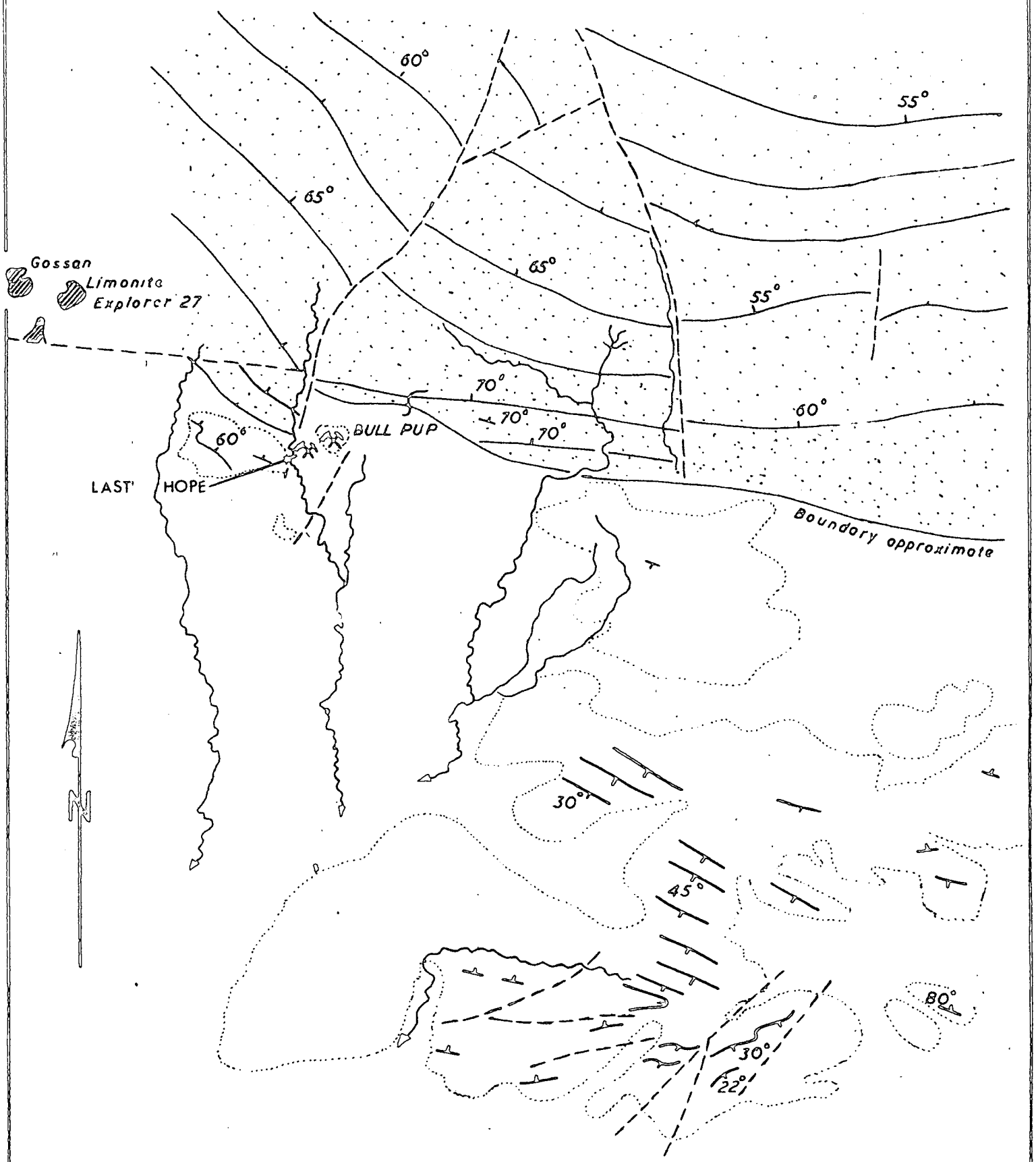
COMPILED BY RESIDENT GEOLOGICAL SECTION: DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN. NOV. 1966.

To accompany Record 1967/127

E53/A14/139

34

PLATE 2



LEGEND

- TOMKINSON CREEK BEDS (Sdsts., Qtzites, Congl.)
- WARRAMUNGA BEDS (Siltstones, tuffaceous sdst.)
- GOSSAN
- OUTCROP BOUNDARIES
- FAULTS

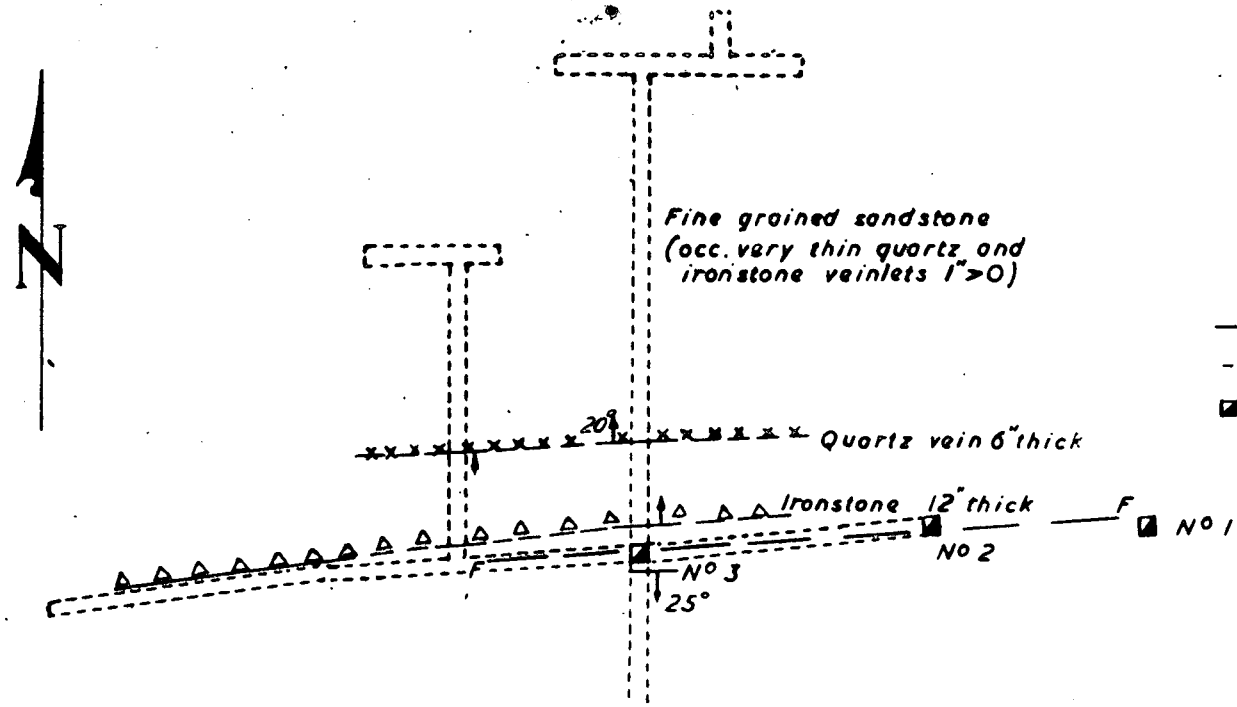
PHOTO-GEOLOGICAL INTERPRETATION
LAST HOPE AREA

0 1 2 3 4
Miles

To accompany Record 1967/127.

E53/A14/140

G66/30E



LEGEND

F — Fault.

Workings.

Shaft No 1 - 14' deep
No 2 - 48 deep
No 3 - 78 deep

↑20° Dip and Strike of bedding.

xx ↥ xx Quartz vein with dip.

ΔΔ ↥ ΔΔ Ironstone with dip.

PLAN OF WORKINGS - 78 FT. LEVEL.

BULL PUP MINE

NORTHERN TERRITORY

0 40 80 120 160

Feet

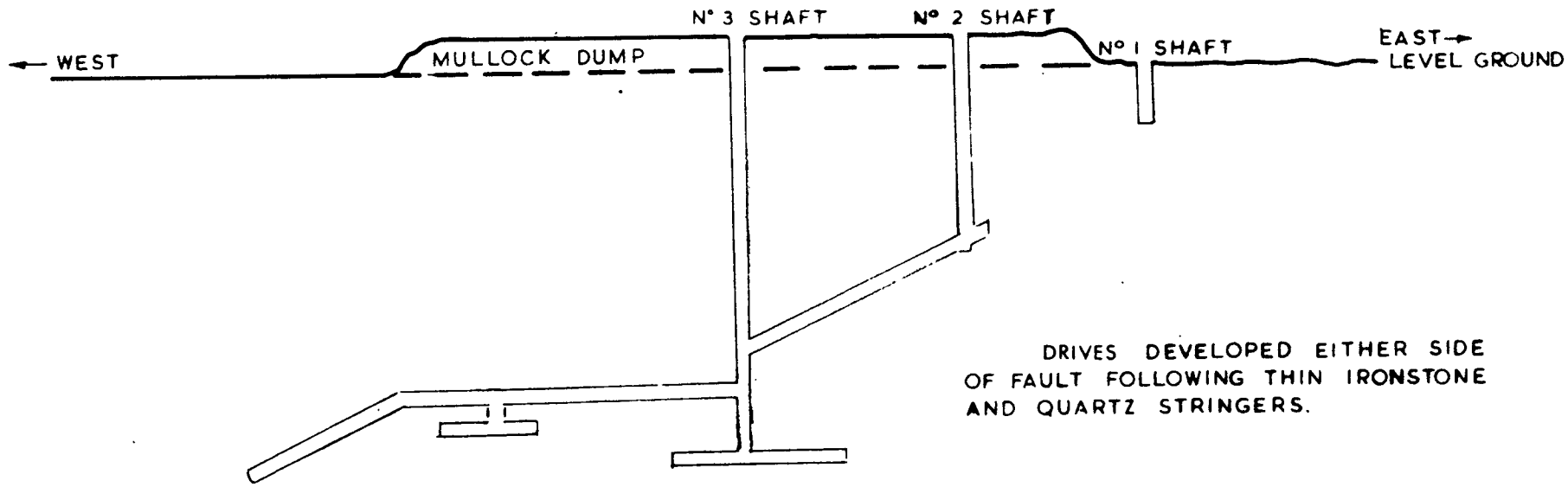
To accompany Record 1967/127

E53/A14/141

COMPILED BY THE RESIDENT GEOLOGICAL SECTION : DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, N.T. NOV 1966.

G66/31E

PLATE 3



DRIVES DEVELOPED EITHER SIDE OF FAULT FOLLOWING THIN IRONSTONE AND QUARTZ STRINGERS.

LONGITUDINAL SECTION OF WORKINGS
BULL PUP MINE

NORTHERN TERRITORY

0 40 80 120 160

Feet

G66/32E

To accompany Record 1967/127

E53/A14/142

PLATE 4

COMPILED BY RESIDENT GEOLOGICAL SECTION: DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, NOV. 1966.

GEOLOGICAL INVESTIGATION OF AMETHYST DEPOSITS, HELEN SPRINGS AREA. NORTHERN TERRITORY

SUMMARY

The Helen Springs Amethyst occurrence is adjacent to the Helen Springs turn-off 100 miles north of Tennant Creek. A tape and compass survey was made of this area, over which an Authority to Prospect has been applied for by Mr. J. Pollard.

In this area the Helen Springs Volcanics overlie fine-grained sandstones of the Tomkinson Creek Beds. The Volcanics consist of vuggy, vesicular basalt and andesite flows. The vugs are infilled with quartz, including minor amounts of amethyst and smoky quartz.

INTRODUCTION

The Helen Springs amethyst occurrence lies 100 miles north of Tennant Creek, adjacent to the Helen Springs turn-off from the Stuart Highway.

At the request of Mr. J. Pollard of Warrabri Native Settlement, a tape and compass survey was made of the area, and the geology was mapped in detail.

GENERAL GEOLOGY

The prospect occurs on the northern extension of a low ridge, which rises forty feet above the level of the Stuart Highway at the Helen Springs turn-off.

The dominant rocks types are basaltic and andesitic flows which are part of the Helen Springs volcanic succession. The flows are predominantly vuggy and amygdaloidal in character, and the vugs are quartz-filled, often with chlorite encrustations.

The volcanic succession overlies a gently east dipping succession of fine-grained sandstones, which are part of the Tomkinson Creek Beds.

Lithology: Tomkinson Creek Beds

The sandstones are coarse-grained, gritty, but poorly consolidated rocks. They dip eastwards at 2° to 10° and underlie the Helen Springs Volcanics. Near the contact with the Volcanics, small patches of chalcedony occur in the joint planes, often associated with small veinlet of hematite.

The sandstones are laminated, the individual laminae averaging one third of an inch in thickness, with marked colour variations.

Helen Springs Volcanics:

The volcanics consist of gently west dipping flows, mainly basalt with a capping of andesite.

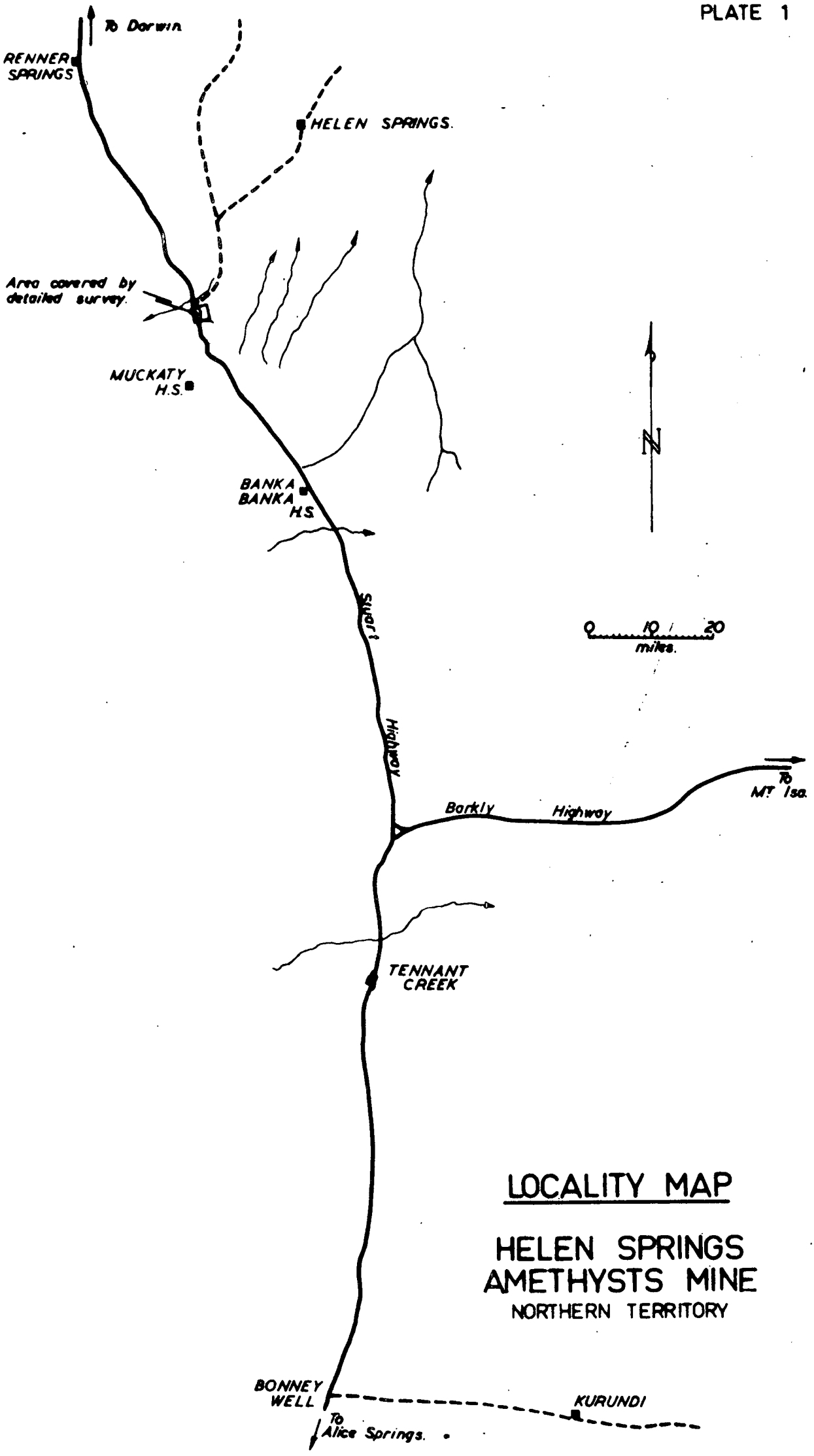
The andesite varies in thickness from four to ten feet. A sample sent to Canberra was described as a hydrothermally altered amygdaloidal ?andesite, having a trachytic texture and consisting of micro-laths of kaolinised and sericitised feldspar (35%) in a groundmass replaced entirely by red iron oxide (45%). Scattered large and small amygdules were filled by quartz (8%) and chlorite (12%).

The basalts are fine-grained melanocratic rocks. Five distinct flows were distinguished in the sequence, each of which has varying amounts of amygdaloidal quartz. All the flows have been hydrothermally altered, especially the upper ones, which contain quartz veins up to 4 feet thick.

Structure:

The area mapped is in the western portion of a shallow basin formed by the Tomkinson Creek Beds. The central portion of this basin is occupied by the Helen Springs Volcanic sequence, (Helen Springs four-mile Geological Map, Preliminary Edition, Bureau of Mineral Resources, Australia, 1966).

PLATE 1



LOCALITY MAP

HELEN SPRINGS AMETHYSTS MINE

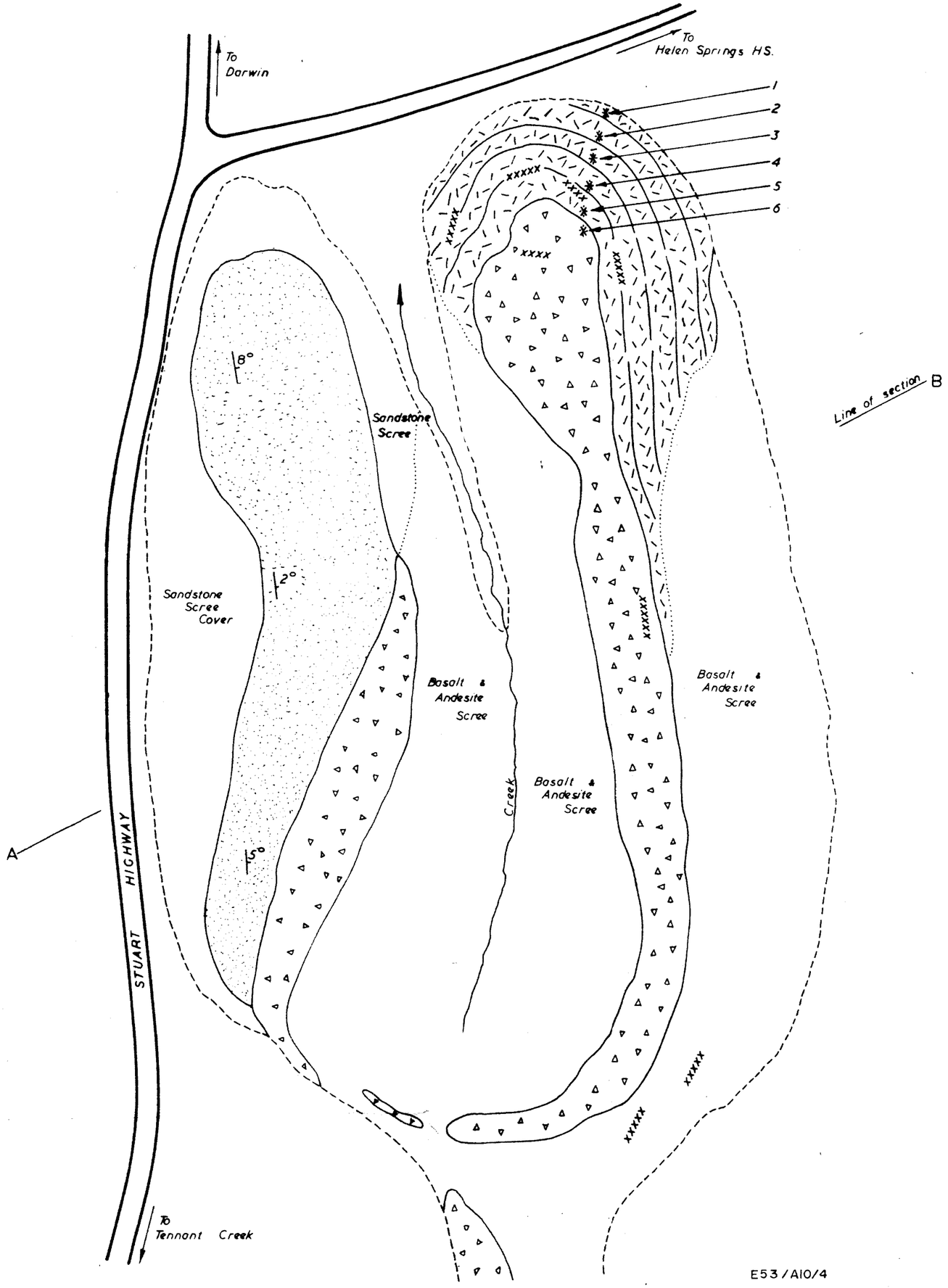
NORTHERN TERRITORY

To accompany Record 1967 / 127

E53 / A10 / 3

G66/33E

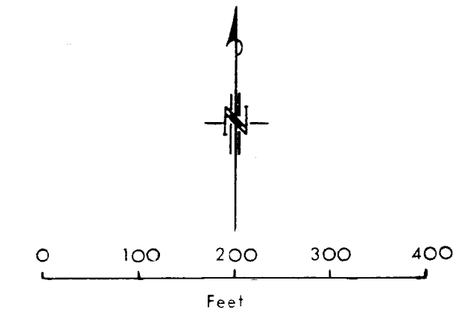
COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DARWIN. NOV 1966.



GEOLOGICAL MAP

HELEN SPRINGS AMETHYSTS OCCURRENCE

NORTHERN TERRITORY



LEGEND

- ANDESITE FLOWS.
- BASALT FLOWS.
- TOMKINSON CREEK BEDS
- ---- OUTCROP BOUNDARIES.
- SAMPLE LOCATION.
- xxxxx QTZ - AMETHYST VEINS.

To accompany Record 1967/127.

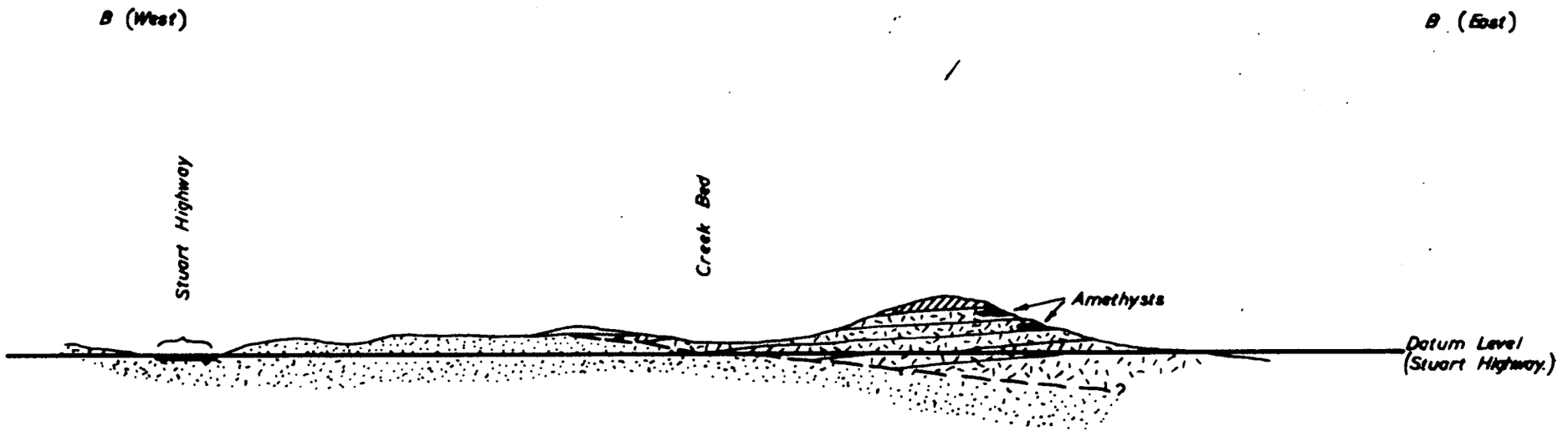
E53/A10/4

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DARWIN. NOV' 1966.

G66/34D

CROSS SECTION

HELEN SPRINGS AMETHYSTS OCCURRENCE



LEGEND

- Basalt Flows.
- Andesite Flow
- Tomkinson Creek Beds

0 100 200 300 400

Feet

PLATE 3

* To accompany Record 1967/127

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DARWIN. NOV 1966.

E53/A10/5 G66/35E

AMETHYST DEPOSITS

The volcanic rocks are hydrothermally altered, and contain secondary quartz as amygdaloidal fillings and as veins in the basalt flows. These veins reach their maximum development (up to four feet thick) just beneath the andesite capping. Several of these veins show distinct banding with translucent white euhedral quartz forming the outer layer, and amethyst and smoky quartz forming the inner layers.

Although the individual crystals are small (up to three quarters of an inch long), their colouring is suitable for gem quality stones.

CONCLUSIONS AND RECOMMENDATIONS

Although the amethyst-bearing rocks reach their maximum development within one zone of the volcanics, they are sporadically distributed throughout the basalts. Further excavation along the known quartz veins, and an extension of the search over a wider area within the favrourable zone are therefore recommended.

At the time of writing, reserves of 40 lbs. of good quality amethysts had been estabished.

Before any further prospecting is done, the saleability of Amethysts of this quality should be investigated.

GEOLOGICAL REPORT ON THE POWER OF WEALTH GOLD MINE, KURUNDI GOLD FIELD NORTHERN TERRITORY

SUMMARY

The Power-of-Wealth goldmine is situated in the Murchison Ranges 55 miles south-south-east of Tennant Creek.

Gold occurs in patchy shoots in a major north-westerly trending, nearly concordant quartz vein in the eastern limb of an anticline of Proterozoic quartzose sediments of the Hatches Creek Group. This vein appears to have been cut off by a fault about 60 feet below the surface.

A programme of underground and surface drilling is recommended to locate the displaced vein, and a search for other ore-shoots is suggested.

INTRODUCTION

The Power-of-Wealth goldmine is situated in the Murchison Ranges, 55 miles south-south-east of Tennant Creek.

Access from Tennant Creek is by the Stuart Highway to Bonney Well, thence by the Kurundi track 19 miles eastward.

The surface geology and part of the exposures in the underground workings were mapped in November 1965. Information on parts of the workings which are now inaccessible was obtained from an earlier report by J. Barclay (1963).

GEOLOGY

The auriferous lode is situated on the eastern limb of a north-south trending anticline in Proterozoic sediments of the Hatches Creek Group. The sediments consist of sandstone and quartzite, with rare sandy pebble conglomerate and shale. Dips are consistently to the north-east at angles between 22 and 40 degrees.

Nearly conformably quartz veins, five to ten feet thick, occur within the sediments. The main auriferous lode is a quartz vein 1500 feet long; south of the main shaft, this dips consistently to the east.

This lode is not exposed in the cross-cut at the 95-foot level from the main shaft, or in either of No. 2 or No. 3 shafts. This indicates that the vein either lenses out, changes dip, or is displaced by faulting.

The quartz is white, with a tendency to pink colouration in the richest gold-bearing sections. Values at the surface are poor and even the best mineralization below surface is patchy and discontinuous.

The mine workings consist of a main shaft and three other shafts numbered 2 to 4. The main shaft is 99 feet deep, with drives at the 40-foot and 95-foot levels. The main lode is exposed at the 40-foot level over a length of at least 70 feet; its average thickness is about 4 feet.

From the 40-foot level an inclined winze follows the lode down dip for 25 feet without reaching the limit of the lode, but assay results show that gold values decrease down dip.

At the 95-foot level, crosscuts extending 80 feet east and 20 feet west from the main shaft, failed to intersect the main lode. Contorted quartzite bands in the eastern crosscut probably indicate drag folding along a fault line. Quartz stringers in these quartzite bands have a low gold content.

Of the other three shafts, No. 2 is the deepest at 74 feet. No. 3 shaft is only 19 feet, and No. 4 only 7 feet deep. No. 2 shaft has an easterly crosscut at the 21-foot level, and an 80-foot westerly crosscut at the bottom of the shaft. None of these workings intersected the main lode.

PRODUCTION

Total gold production figures are not known, but Barclay (1963) gives the following details for two parcels of ore mined from the 40-foot level, in 1950.

Ore treated	Gold won by Amalgamation	Tailings
18 tons	5 ozs.	6.5 dwts/ton
21 tons	6 ozs	1.7 dwts/ton

RECOMMENDATIONS

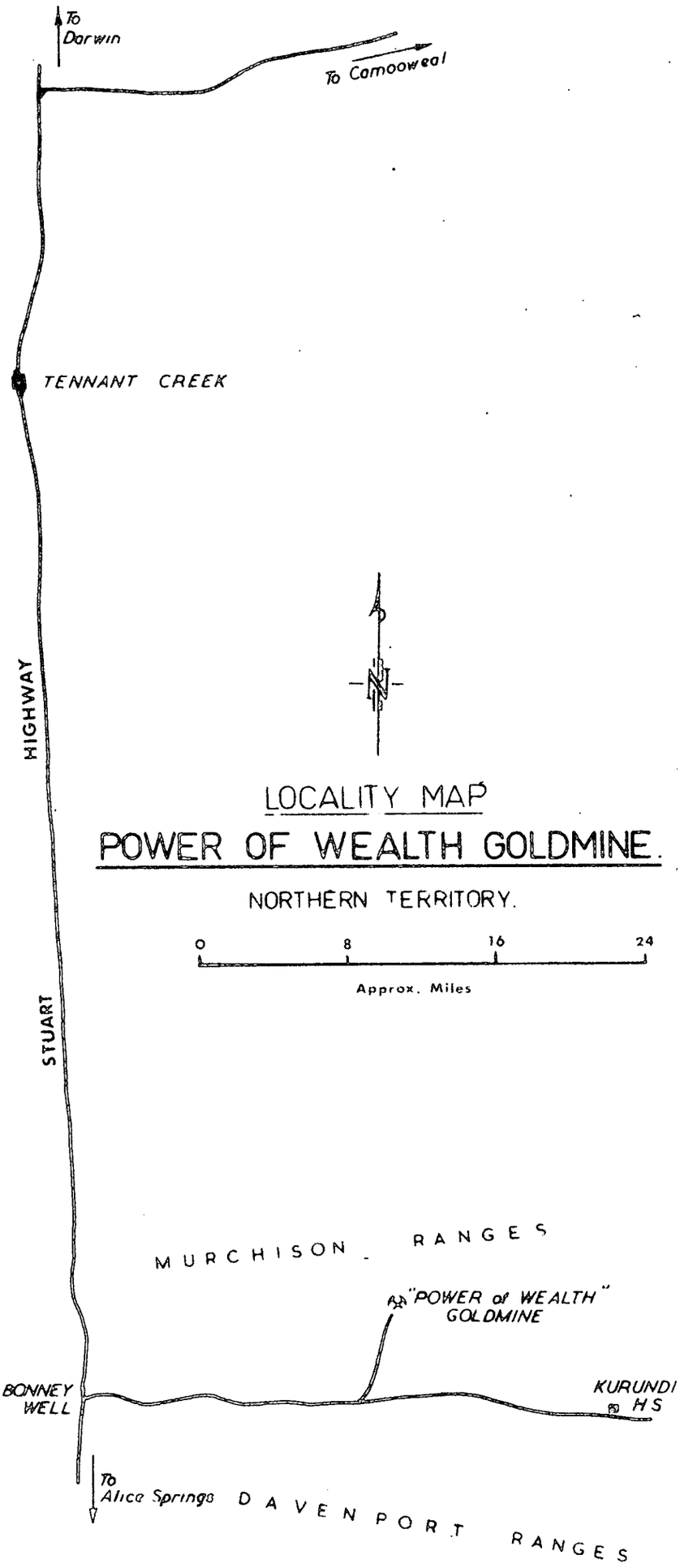
Further work should be directed towards defining the extent of mineralization in the main lode along strike and down dip, and searching for extensions of the main lode displaced by faulting.

A programme of underground drilling is therefore recommended as shown on Plate 3, and a wagon-drilling programme from the surface is recommended to search for extensions of the known ore shoot along strike.

Any other portions of the main lode showing gold values in surface samples should also be tested by wagon drilling.

REFERENCES

BARCLAY, J., 1963 - Geological Investigation of the Power of Wealth Gold Mine, Kurundi Area, N.T. In Minor Metalliferous Investigations, Northern Territory Resident Geological Section. Bur. Min. Resour. Aust. Rec. 1963/3. (unpubl.)



LOCALITY MAP
POWER OF WEALTH GOLDMINE.

NORTHERN TERRITORY.

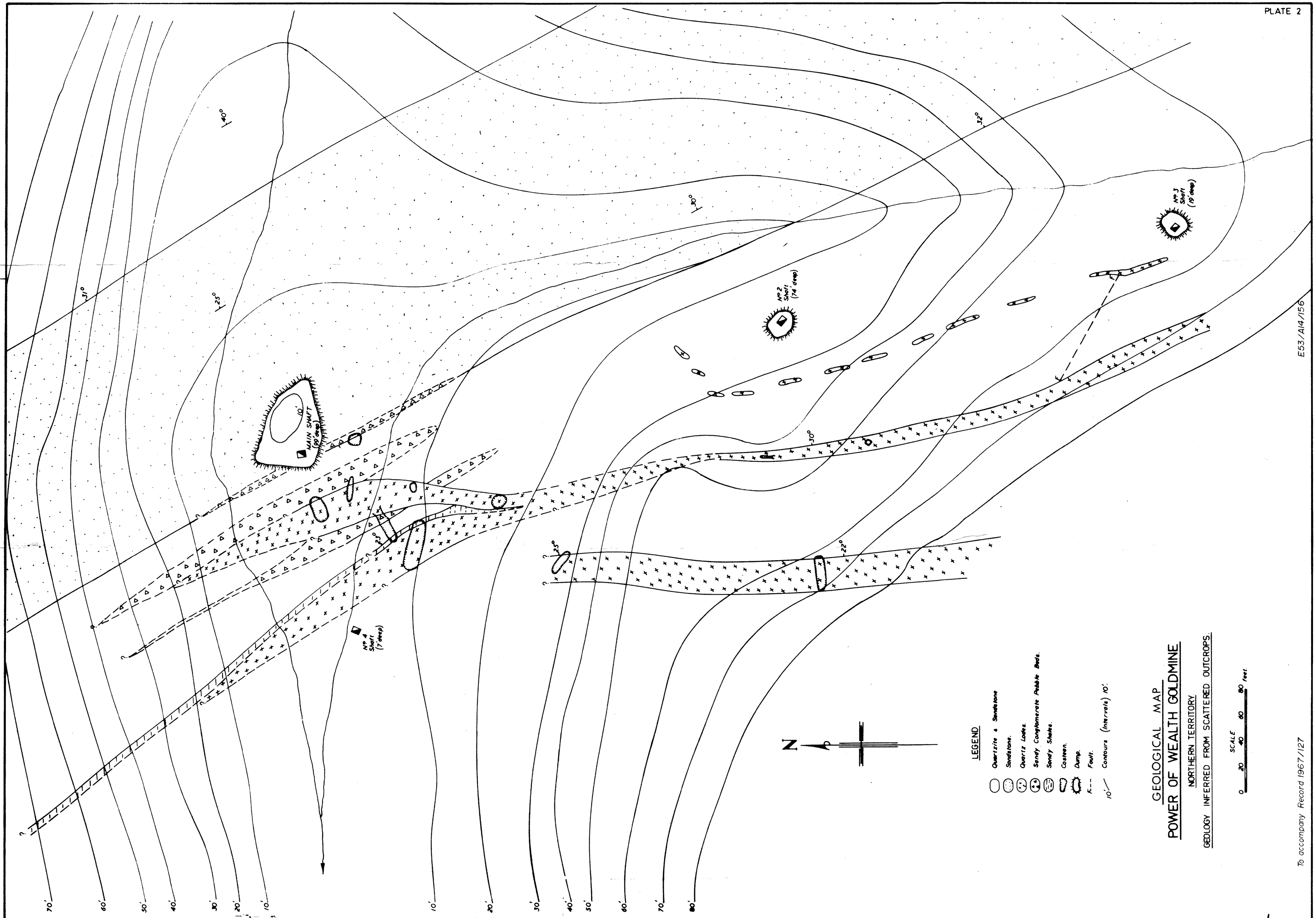
To accompany Record 1967/127

E53/A14/155

G66/40E

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DARWIN NOV' 1966

PLATE 2



LEGEND

- Quartzite & Sandstone
- Sandstone.
- Quartz Lodes.
- Sandy Conglomerate Pebble Beds.
- Sandy Shales.
- Costeen.
- Dump.
- Fault.
- 10'/ Contours (intervals) 10'.

GEOLOGICAL MAP
POWER OF WEALTH GOLDMINE

NORTHERN TERRITORY

GEOLOGY INFERRED FROM SCATTERED OUTCROPS.

SCALE 0 20 40 60 80 feet

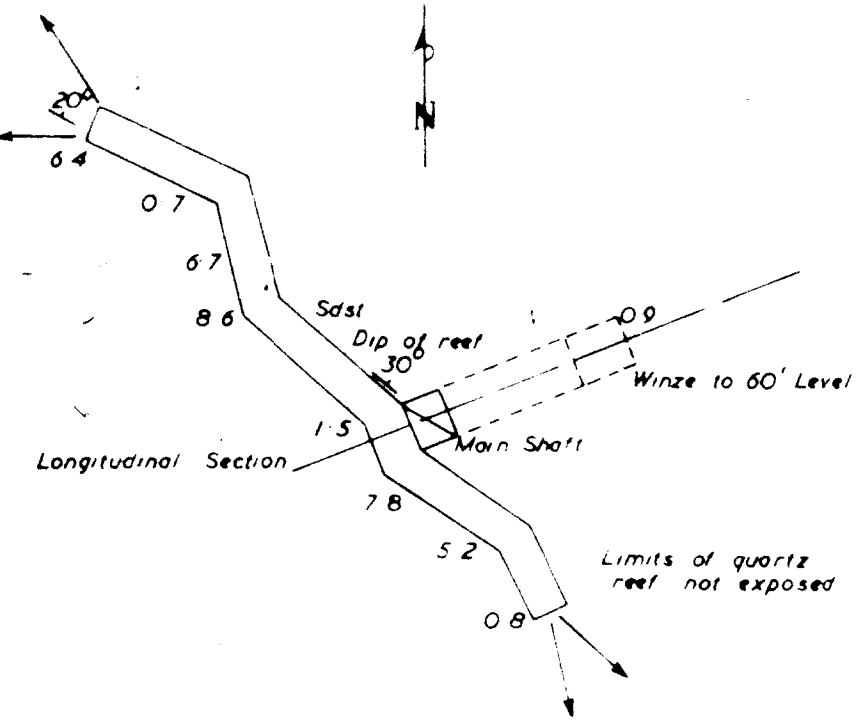
E53/A14/156

To accompany Record 1967/127

G66/41C

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DARWIN NOV 1966.

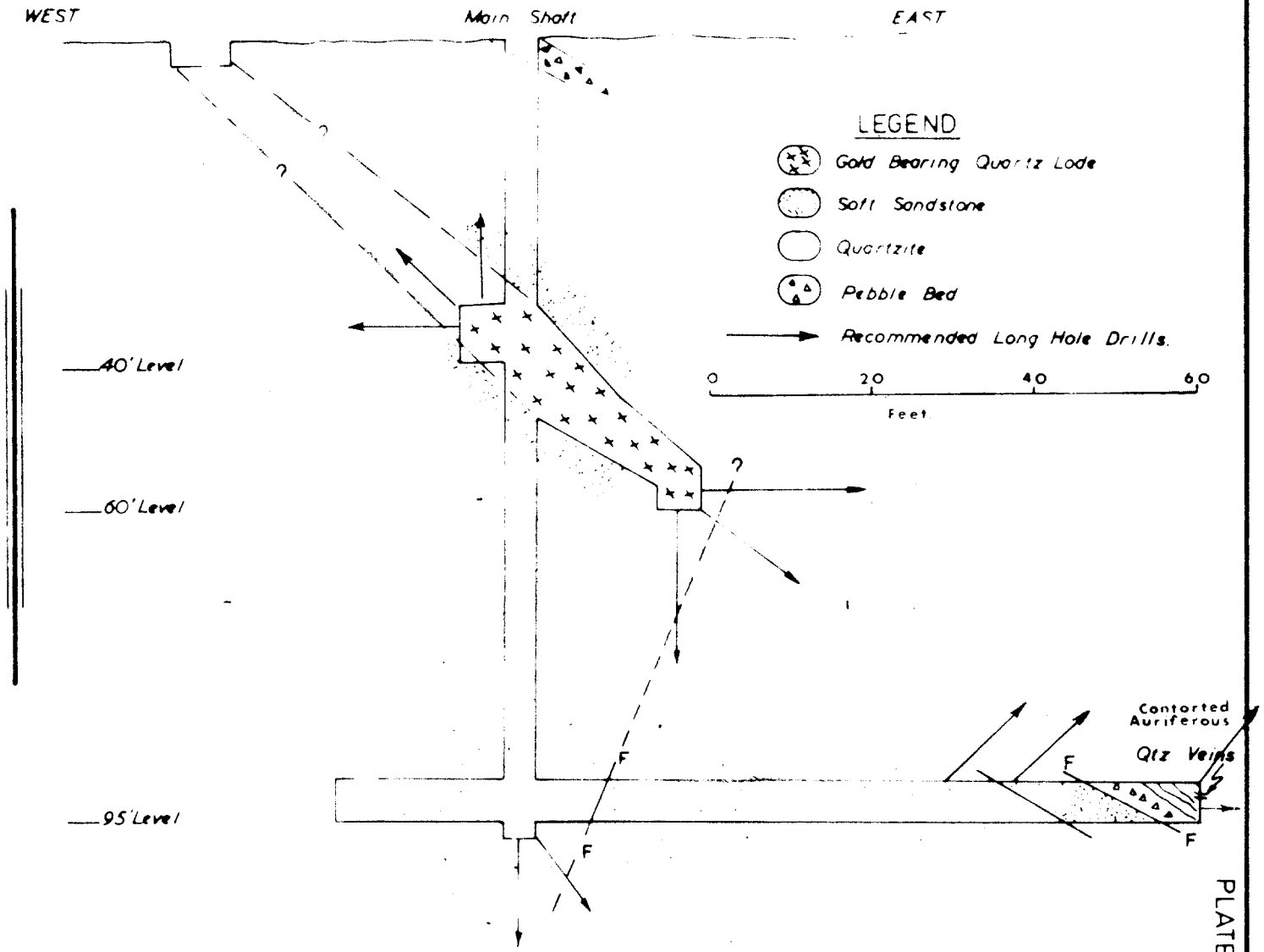
UNDERGROUND WORKINGS
POWER OF WEALTH GOLDMINE
NORTHERN TERRITORY



Assay Values = dwts / ton Gold

PLAN OF WORKINGS – 40' LEVEL
FROM MAIN SHAFT
(After J Barclay)

0 20 40 60
Feet



CROSS SECTION OF WORKINGS THROUGH MAIN SHAFT (After J.Barclay)

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DARWIN. NOV. 1966

G66/42E

To accompany Record 1967/127

E53/A14/157

PLATE 3