GEOLOGY OF THE McKINLEY SILVER/LEAD PROSPECT

- by -

R. G. DODSON

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SUMMARY

This report provides a brief outline of the geological setting of the silver/lead and zinc mineralization at the McKinley Lead Mine. Records of early mining indicate that the ore is particularly rich in silver.

Under agreement with the lessees, two diamond drill-holes were put down to test the ore at depth as much of the lode near the surface has been mined. Drilling revealed that both the thickness and quality of the lode declines with depth. The silver ratio remains high. More significant is the fact that silver occurs independently of lead, in small veinlets within siltstone of the Burrell Creek Formation.

Further work is recommended to search for silver and silver/lead lodes near the surface.

INTRODUCTION

The McKinley Silver/Lead prospect is situated about two and a half miles south-south-west of Spring Hill, and about one mile west of the North Australian Railway line. Access is by a well worn track which branches southwards off the road connecting Spring Hill with the Stuart Highway. The track closely follows the disused Pine Creek Palmerston road.

During June 1969, two brief visits were made to the prospect to map the exposed geology and the main surface features around two disused shafts known as Heffernon's workings. The object of the survey was to assess the value of diamond drilling to test the ore at depth. The survey was made at the request of the Director, Mines and Water Resources Branch, following an application for assistance by the lease-holders.

GENERAL GEOLOGY

The prospect occurs in steeply dipping siltstone of the Burrell Creek Formation and is situated within the shear zone between Burrundie and Pine Creek.

The mineralization is contained in a ferruginous quartzose lode infilling a roughly north-north-west aligned shear. At the surface exposure of Heffernon's workings, the lode is somewhat gossanous, rich in secondary lead and silver minerals. The lode dips at between 70° and 80° east-ward, coinciding with a joint plane orientation.

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Parkes (1891) recorded that the lode dipped eastward at 55° to a depth of about 130 feet.

HISTORY OF MINING

Records of early operations in the McKinley mine area go back as far as 1888 when 22 tons of ore yielding 70% lead and 156 ozs. of silver/ton were sent for treatment. This ore came from "a lode about 3 feet wide". By 1891 Heffernon's workings had been mined to a depth of 126 feet yielding 239 tons of ore which assayed at between 30% lead, 47 ozs. silver/ton and the most valuable ore of 11% lead, 3,740 ozs. silver per ton and 41 dwt/ton gold. Following a recommendation by J. V. Parkes, Inspector of Mines, sinking of a vertical shaft 200 feet south of Heffernon's workings was begun but all work on the lease was discontinued in 1891 because of the decline in the price of silver and the mining difficulties caused by the presence of water in the underground workings.

The present lease holders attempted to sink an exploratory shaft between the main shaft and Heffernon's workings, but inflow of water temporarily stopped the work.

CONCLUSION AND RECOMMENDATIONS

Parkes (1891 p1) recommended the sinking of a shaft 200 feet south of the Heffernon's workings. The reasons given for this recommendation are obscure, as Parkes states ".... I would recommend that the place be further tried. There is a belt of slate to the eastward of this outcrop (Heffernon's workings) and I am of opinion that when this is reached the lode will not go through it but may take a course southwards; if the latter it may be of some value. But this can only be proved by sinking the shaft deeper and then driving to the eastward."

At the surface the siltstones exhibit little heterogeneity suggested by Parkes but exposures in the shafts now collapsed may have provided proof of a belt of slate contiguous to the siltstone. Again, there appears to be little reason why the lode should not extend beyond such a belt as the ore is quite obviously not of syngenetic origin but appears to be emplaced in a joint shear which coincides with a defined orientation in this area.

The richness of the ore and the thickness of the lode (more than 2 feet) at a proven depth of 130 feet make the prospect worth further investigation at depth by diamond drilling.

A single diamond drill hole is initially recommended to test the lode below the water table. The first drillhole is planned to intersect the lode if the easterly dip persists. Sufficient drilling depth should be allowed for to intersect the lode if the dip varies from a known alignment. Further drilling will depend on the results of the first drill hole.

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Recommended Drill hole No. 1 McKinley Prospect:

Collar: 240 feet (Magnetic) East from main shaft.
Depression: 50° from horizontal.
Direction: Due (Magnetic) West.
Total Depth: 400 feet.

Depth to intersection if lode orientation of 55° E persists:

Downhole: - 189 feet.
Below surface: 150 feet.

REFERENCES

Parkes J. V. 1891 ... "Report on Northern Territory Mines and Water Resources" South Australia.

Govt. Resident 1880-1904 ... "Annual Reports."

RESULTS OF THE DIAMOND DRILLING

INTRODUCTION

Two diamond drillholes were put down between July and October 1969 to test at depth the orebody exposed at Heffernon's workings. The holes were drilled by a Mines and Water Resources Branch drillcrew, under agreement with the lessees.

DETAILS OF THE DRILLING

Drillhole No. 1 was put down to a total depth of 420 feet. The collar was positioned 240 feet east (magnetic) from Main Shaft, with a depression of approximately 54° from horizontal. The geological succession passed through consists of alternating bands of fine grained siltstone and medium to fine grained greywacke. Contacts are typically diffuse. A narrow mineralized zone rather than solid lode was intersected at a downhole depth of 333 feet, roughly 255 feet below the surface (see Geological Log).

Drillhole No. 2 was planned to test the lateral extension of the lode northwards. The drillhole was sited 180 feet east (magnetic) of Heffernon's workings, with a depression from horizontal of 59½°. At a downhole depth of 240 feet, roughly 195 feet below the surface, the mineralization consists of veins enriched in galena and sphalerite within approximately two feet of core. Analysis of scrapings from ten feet lengths of core in both DDH 1 and DDH 2 revealed slight enrichment of silver in the upper weathered core presumably through dispersion and consequent 'fixing' of the silver ions released by weathering in the oxidised zone. In the interval 270 - 280 feet of DDH 2, an unusually high silver content was recorded by analyses. The lead content of this scraping sample is low (see analysis results). Confirmatory assay results on split core lengths for the intervals 270' - 272½', 272½' - 275', 275' - 277½' and 277½' - 280', yielded lower silver values but there is little doubt that the silver is present independently of lead mineralization. Microscopic examination of the siltstone revealed the presence of fine textured dark grey coloured amorphous veins with rare crystals of argentite(?). The higher silver values in the scrapings are probably due to the less resistent nature of the veins, in comparison with more resistent siltstone.

CONCLUSIONS AND RECOMMENDATIONS

Judging from the available information about the ore mined at McKinley and nearby prospects in the past, togetner with data obtained by drilling, there is little possibility of a large scale mining operation. Mining on a modest scale may be possible by extraction of the thicker part of the lode, near the surface.

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THE EXAMINATION OF THE GALENA SAMPLES FROM McKINLEY MINE, N.T.

- by -

I. R. PONTIFEX

Description of Polished Section: No. 1 Sample.

Most of this section, (estimated up to 60%) consists of fine-grained galena; this contains scattered grains of pyrite, sphalerite and quartz, and irregular patches of pyrargyrite.

Pyrite occurs in discrete euhedral grains of an average size of about 0.06 mm. across; commonly these are concentrated into aggregates within the galena. In some aggregates the grains appear to have fused to form large irregular patches ofpyrite. Pyrite constitutes up to 15% of the section.

Sphalerite occurs in subrounded, anhedral grains of an average size of about 0.1 mm. across; it forms an estimated 10% of the section. The grains tend to form aggregates. The sphalerite generally contains very fine exsolution bodies of chalcopyrite.

Pyrargyrite occurs in highly irregular patches scattered through the galena. It is intimately associated with the galena, and although it tends to be locally abundant in some areas, there is no apparent preferential distribution or association with other minerals in the section. The shape of the pyrargyrite grains is very irregular and they vary considerably in size from 0.03 mm. to patches which measure 0.8 mm. x 0.5 mm.

In polished sections the pyrargyrite has a pale bluish-white or pale bluish-grey colour and it has distinct blood-red internal reflections. This is associated with, and in places bordered by, minor amounts of another mineral which has a very pale olive-grey colour with a bluish tint. The internal reflections while present, are not as distinctive as in the pyrargyrite. It is believed that this mineral is another silver sulpho-salt, possibly proustite.

X-Ray and electron Probe Analysis

The identification of the pyrargyrite was confirmed on the X-ray diffractometer, but there was no positive indication of other silver-sulphosalts in the sample.

The distribution of silver in this section was examined by R. England on the electron-probe. It was found that the silver is essentially restricted to the pyrargyrite although very small amounts do occur in the galena in areas which contain no recognisable silver-mineral phase.

../2

Description of Polished Section: No. 2 Sample.

The same assemblage of minerals were recognized in this section as in Section No. 1. The galena is much coarser grained however, and there is less pyrargyrite, sphalerite and pyrite, but more quartz gangue than in No. 1.

The mode of occurrence of the minerals in each section is the same with the exception that in sample No. 2. all ore minerals enclosed in the galena form smaller grains, aggregates, and patches. The maximum dimension of pyrargyrite patches in this section is 0.3 mm x 0.15 mm.

No further examination was done on this section, but it is assumed that, (as in sample No. 1), the silver is essentially restricted to the pyrargyrite.

Comment

The grain size of the galena may have some control on the silver content, with the greatest amount of silver possible contained in the finer grained galena. It is not possible to confirm this on the examination (and assay) of only two samples, but it may be worthwhile to correlate the grain size of the galena and future assay results, with the aim of identifying the relatively silver-rich areas in the ore.

...oOo...

The high silver content of the lead ore and the presence of silver mineralization independent of galena is considered worth further investigation. The most efficient method of locating silver or silver/lead mineralization at or near the surface in this geomorphological environment is by geochemical survey: collecting surface samples of soil or weathered rock from stations on a surveyed grid. Geophysical methods such as Electromagnetic or Induced Polarization surveys may prove successful.

CORE FROM MOUNT MCKINLEY RIVER D.D.H. 1.

(LEAD MINE)

CORE INTERVALS	OZ/TON	PARTS PER MILLION			
	Ag	Cu	Pb	Zn	Ni
0 - 10'	0.8	45	235	390	25
10 - 20'	0.5	25	75	220	18
20 - 30'	<0.2	10	75	190	18
30 - 40'	"	15	90	125	18
40 - 50'	"	25	45	65	18
50 - 60'	"	5	45	110	18
60 - 70'	"	5	30	140	25
70 - 80'	"	20	60	320	18
80 - 90'	"	15	45	165	25
90 - 100'	"	10	45	125	25
100 - 110'	"	38	30	65	18
110 - 120'	"	10	45	380	25
120 - 130'	"	5	30	115	25
130 - 140'	"	15	45	260	25
140 - 150'	"	25	75	750	18
150 - 160'	"	15	60	205	25
160 - 170'	"	15	60	145	25
170 - 180'	"	15	60	375	35
180 - 190'	"	5	45	125	25
190 - 200'	"	20	45	175	25
200 - 210'	"	5	30	165	25
210 - 220'	"	5	45	140	25
220 - 230'	"	10	30	230	25
230 - 240'	"	10	30	435	18
240 - 250'	"	10	30	190	25
250 - 260'	"	5	15	170	18
260 - 270'	"	15	30	300	18
270 - 280'	"	10	30	310	25
280 - 290'	"	15	45	275	18
290 - 300'	"	15	30	245	25
300 - 310'	"	20	1100	620	18
310 - 320'	"	38	75	850	18
320 - 330'	"	15	75	235	25
330 - 340'	0.9	15	5600	330	25
340 - 350'	<0.2	25	3950	350	18
350 - 360'	"	15	105	205	35
360 - 370'	"	20	60	205	18
370 - 380'	"	15	45	235	18

../2

CORE INTERVALS	OZ/TON	PARTS PER MILLION			
	Ag	Cu	Pb	Zn	Ni
380 - 390'	<0.2	10	45	315	18
390 - 400'	"	38	60	245	25
400 - 410'	"	5	30	215	25
410 - 420'	"	10	30	315	25

Detection Limits:

Ag	0.2 oz/ton
Cu	5 ppm
Pb	10 ppm
Zn	2 ppm
Ni	10 ppm.

Assay for Core Intervals 333' - 334'6" (DDH 1):

Silver	2.3 oz/ton
Lead	2.35%
Zinc	3.0%
Gold	0.24 dwts/ton.

331' - 336' Resplit & assayed.

	Ag	Pb	Zn
331'-332'	0.3[illegible] g/ton	0.47%	0.01%
332'-333'	0.35 g/ton	1.64%	0.01%
333'-334'	3.5 g/ton	3.11%	4.55%
334' -335'	0.45 g/ton	0.08%	0.01%
335' -336'	0.30 g/ton	0.01%	<0.01%

M.R.J. 30/6/71

CORE SCRAPINGS McKINLEY RIVER D.D.H. 2.

(LEAD MINE)

CORE INTERVALS:	OZ/TON	PARTS PER MILLION		
	Ag	Cu	Pb	Zn
0 - 10'	<0.2	20	83	94
10 - 20'	"	15	60	67
20 - 30'	"	15	48	58
30 - 40'	"	23	48	172
40 - 50'	"	23	53	378
50 - 60'	"	14	60	364
60 - 70'	"	23	68	164
70 - 80'	"	25	145	131
80 - 90'	"	33	240	300
90 - 100'	"	37	44	264
100 - 110'	0.3	37	54	400
110 - 120'	<0.2	25	48	230
120 - 130'	"	29	48	225
130 - 140'	"	41	164	230
140 - 150'	"	40	226	297
150 - 160'	"	25	48	303
160 - 170'	"	28	41	366
170 - 180'	"	23	41	334
180 - 190'	"	40	100	570
190 - 200'	"	18	52	860
200 - 210'	0.4	20	90	678
210 - 220'	<0.2	6	100	598
220 - 230'	"	6	495	615
230 - 240'	"	6	814	2345
240 - 250'	1.5	27	13050	1550
250 - 260'	0.5	263	641	520
260 - 270'	<0.2	6	58	430
270 - 280'	13.1	47	95	591
280 - 290'	0.2	6	40	558
290 - 301'	0.4	21	65	1235
Assays for Sections:				
270 - 272½'	3.3	10	270	78
272½ - 275'	1.2	20	90	73
275 - 277½'	4 dwts/ton	10	60	68
277½ - 280'	5 dwts/ton	28	25	69

Assay for Core Intervals 237'6" - 239'6" (DDH 2):

Silver	1.3 oz/ton
Lead	17.3%
Copper	.005%
Zinc	.12%

Results of Assays 232'-233', 237'-242'

	Ag	Pb	Zn
232' - 233'	0.24 oz/ton	0.93%	0.30%
237' - 239'	0.68 oz/ton	1.97%	0.83%
239' - 242'	1.36 oz/ton	1.29%	0.13%

#2.9 30/6/71

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE No 2 CO-ORDINATES R.L. GROUND

LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R.L. CASING / DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Med grained greywacke			98			
Fine textured chloritic siltstone/shale			100			
Med grained greywacke with narrow quartz partings			100		Quartz vein at 233'	
Fine grained chloritic siltstone with patchy galena mineralization between 237½' and 239½'			98		Quartz veins with rare galena at 240', 241'3", 242'	
Greywacke			100			
Medium to fine-textured siltstone			98			
Medium grained greywacke			98			
END OF HOLE 304'						

210 220 230 240 250 260 270 280 290 300

DRILL NO. TYPE DRILLER COMMENCED COMPLETED

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

■ Galena ▲ Sphalerite

HEAD OFFICE

LOGGED BY RGD

DRAWN BY RGD

CHECKED BY

SHEET 3 OF 2

DRAWING NO.

GD130

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE NO. 1 CO-ORDINATES R.L. GROUND

LOCATION EAST OF MAIN SHAFT ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
100							
Medium to fine grained greywacke							
110				97		Chlorite rich parting with pyrite	
120 Chloritic siltstone with rare seams of pyrite							
130				98			
140							
Medium grained greywacke				100			
150 Siltstone grading to greywacke							
			BX	97			
160							
Greywacke with slight banding							
170				100			
180 Chloritic siltstone parting						Pyrite, Pyrrhotite	
Medium to fine grained Slate with slump structures							
190				96			
200							

DRILL NO.

TYPE

DRILLER

COMMENCED

COMPLETED

CASING IN HOLE DURING DRILLING

REFERENCES

EXPLANATION

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GD130

G69/143E

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE NO 1 CO-ORDINATES

LOCATION EAST OF MAIN SHAFT R.L. GROUND

ANGLE FROM HORIZONTAL 54° DIRECTION MWEST

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Quartz vein in weathered rock				40			
Medium grained greywacke with rounded to ovoid clay pellets				91		Narrow Quartz Vein	
Gradational contact							
Pale grey to fawn siltstone				94			
Medium grained greywacke							
Fine grained siltstone				89			
Greywacke				96			
Fine grained siltstone							
Medium to coarse greywacke				98		Chlorite rich Shear with pyrite	
Chloritic siltstone with rare patches of pyrite mineralization.				97			

BX

DRILL NO.
TYPE
DRILLER
COMMENCED
COMPLETED

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

Siltstone, slate

Greywacke

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DRAWING NO.

GD130

G69/142E

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GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE No. 1 CO-ORDINATES R L GROUND

LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Medium grained greywacke grading to fine texture				98		Quartz vein at 210'	
						Narrow seams of pyrite in cleavage planes	
Fine textured siltstone				95			

200 210 220 230 240 250 260 270 280 290 300

DRILL NO. TYPE. DRILLER. COMMENCED. COMPLETED.

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

HEAD OFFICE

LOGGED BY DRAWN BY CHECKED BY

SHEET 3 OF 1

DRAWING NO. 2591-E

GD130

EJ

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE No. 1 CO-ORDINATES R L GROUND

LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
300							
Medium to coarse-grained greywacke				98		Pyrrhotite in narrow seam	
310							
320							
Medium to fine grained siltstone with rare pyrite seams in cleavage and joint planes.				97		Galena between 333' – 334'6"	Pb = 2·35% Zn = 3·0% Ag = 2·3oz/ton Au = 0·24dwt/ton
330							
Greywacke, with chlorite rich partings						Narrow quartz vein at 341'	
340							
				96			
350							
360							
Homogeneous siltstone, fine textured, chloritic							
370							
				100			
380							
390							
Greywacke, fine grained chloritic siltstone				100			
				98			
400							

DRILL NO. TYPE

DRILLER COMMENCED COMPLETED

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

■ Galena ▲ Sphalerite

HEAD OFFICE

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SHEET 4 DRAWING NO. G69/1458

GD130

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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE No 1 CO-ORDINATES R.L. GROUND

LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
400							
410 Greywacke Compact, finely banded				100			
Fine grained, banded siltstone.							
420 END OF HOLE 400'							

DRILL NO

TYPE

DRILLER

COMMENCED

COMPLETED

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

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SHEET 5 OF 1

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GD130

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GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE No. 2 CO-ORDINATES R.L. GROUND

LOCATION E. of Heffernon's Workings ANGLE FROM HORIZONTAL 59½° DIRECTION MWest

DESCRIPTION OF CORE	R.L. CASING / DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Pale grey to fawn weathered siltstone		NX	80			
Lower limit of oxidation						
Pale grey siltstone			97			
Med to fine textured greenish grey greywacke			94			
Grey siltstone, chloritic; finely banded with fawn clay pellets Slump textures		BX	98		Pyrrhotite in narrow qtz vein 80', 80'6" Pyrite, Pyrrhotite in qtz vein at 88', 92'	
Medium textured greywacke						

DRILL NO. ..... TYPE .....

DRILLER ..... COMMENCED ..... COMPLETED .....

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

Siltstone

Greywacke

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SHEET 1 OF 2

DRAWING NO 669/147E

GD130

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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT McKINLEY LEAD MINE REMARKS

HOLE No. 2 CO-ORDINATES R L GROUND

LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Medium to fine grained greywacke				98			
Contact gradational							
110' Finely banded chloritic siltstone/shale, chlorite mainly in cleavage planes							
120'							
		BX					
130'				100			
140'							
150'							
Medium grained greywacke							
160'				97			
170'							
Chloritic siltstone							
180'				96			
190' Medium grained greywacke with chlorite rich lenses						Quartz veins at 195', 195'5", 196'	
200'							

DRILL NO.

TYPE

DRILLER

COMMENCED

COMPLETED

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

HEAD OFFICE

LOGGED BY RGD

DRAWN BY RGD

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SHEET 2 OF 2

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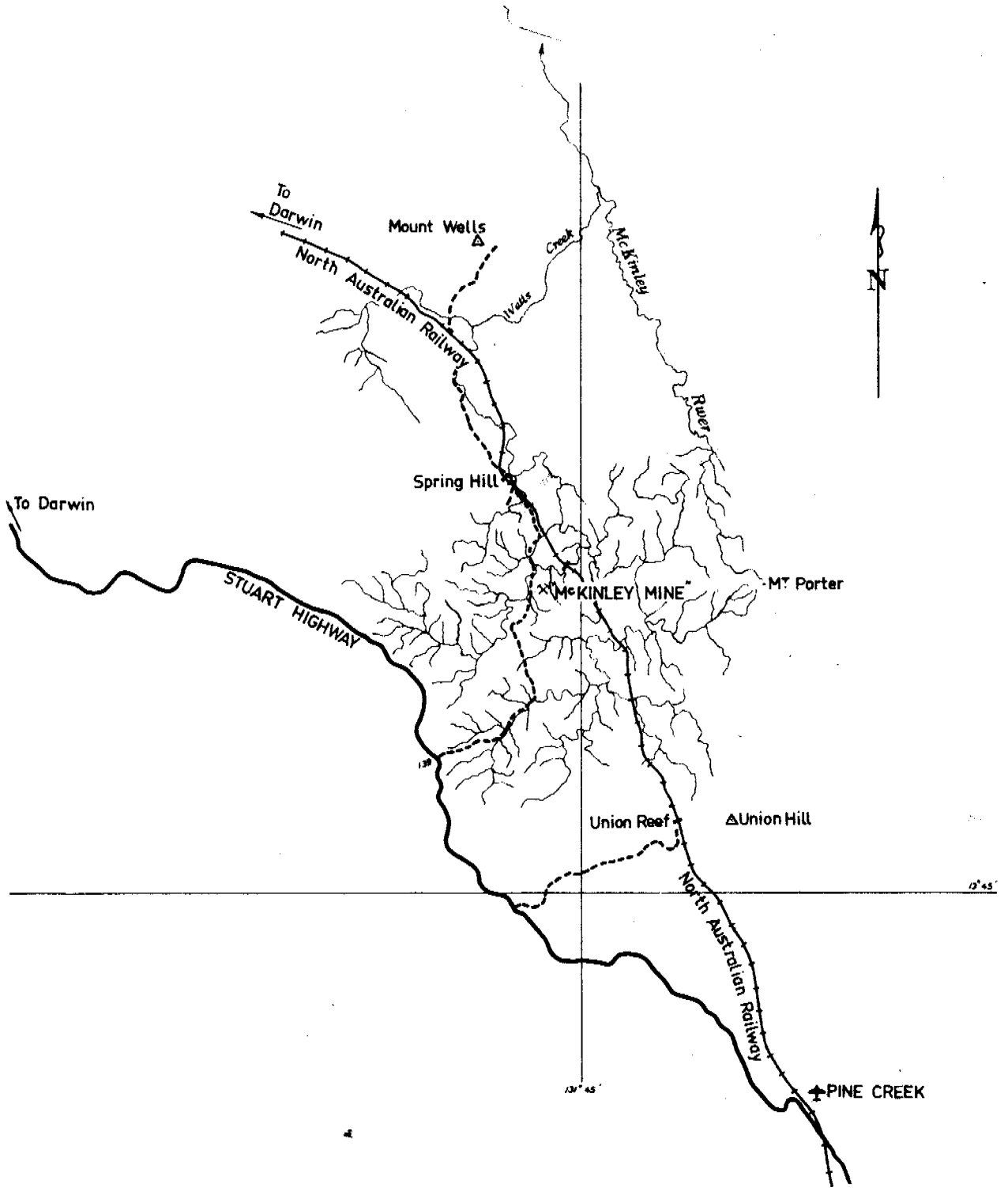
GD130

EJ

PLATE 1



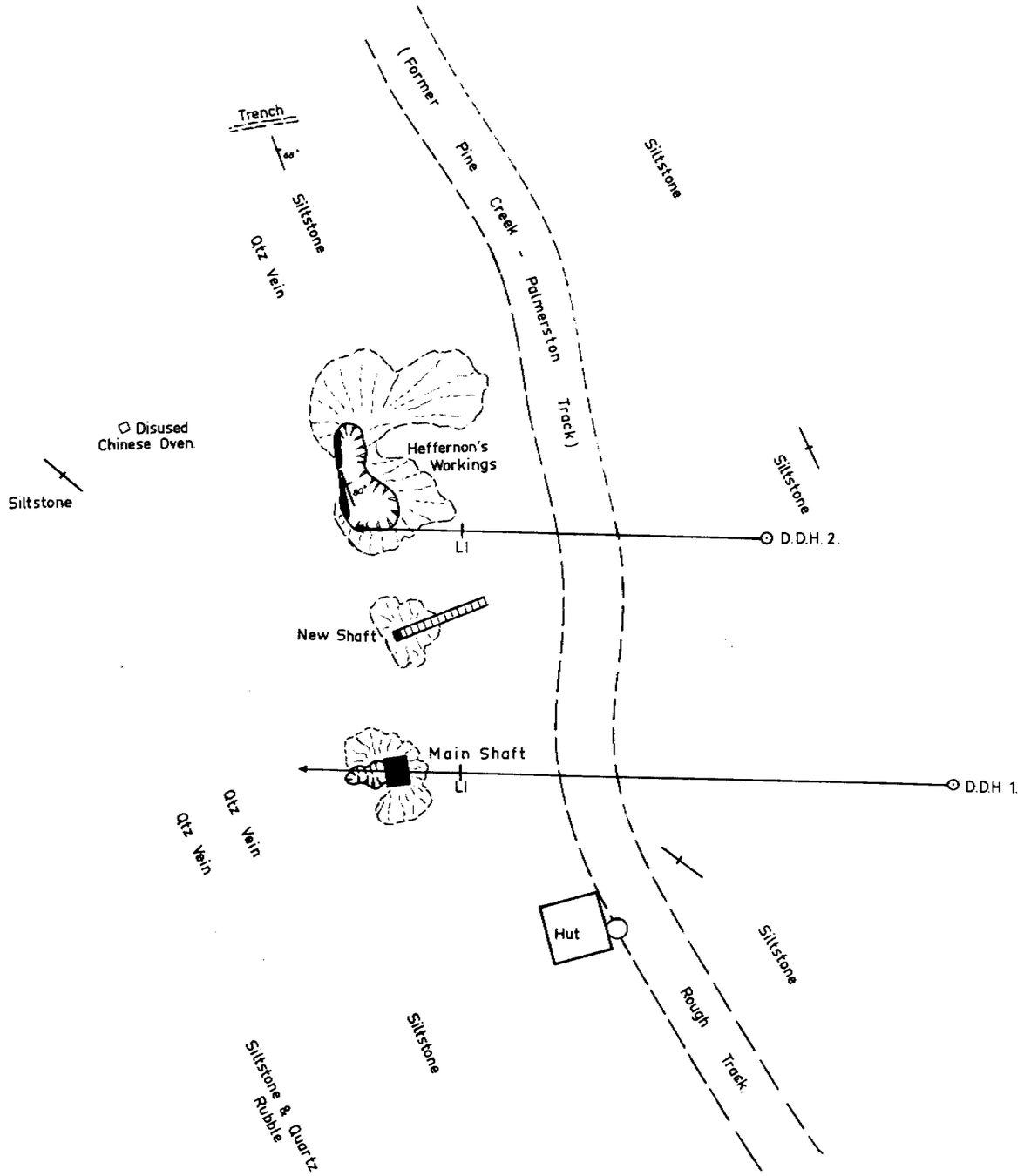
LOCALITY MAP
McKINLEY SILVER/LEAD MINE

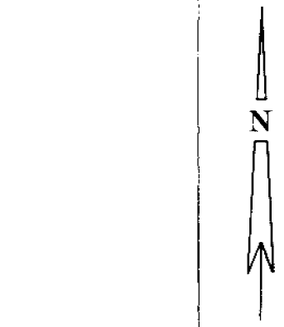
5 0 5

Scale in miles

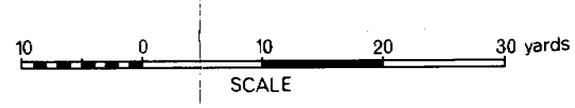
COMPILED BY RESIDENT GEOLOGICAL SECTION
DRAWN BY MINES AND WATER RESOURCES DRAUGHTING OFFICE DARWIN JULY 1969.

G69/49E





DETAILED MAP
of
HEFFERNON'S WORKINGS
McKINLEY SILVER/LEAD MINE



LEGEND

- Drill Holes
- Dip of Bedding (vertical)
- Dip of Bedding
- Ore Dumps
- Pit
- Excavation
- LI Lode intersection

COMPILED BY RESIDENT GEOLOGICAL SECTION
DRAWN BY MINES AND WATER RESOURCES DRAUGHTING OFFICE DARWIN JULY 1969

G69/50D