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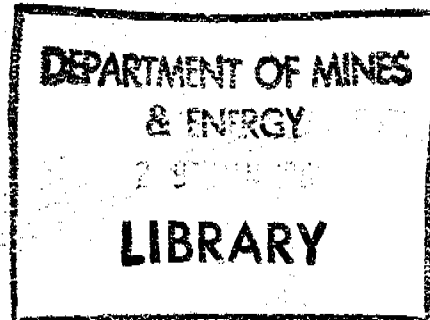
NORTHERN TERRITORY GEOLOGICAL SURVEY

GS 81/6

TECHNICAL REPORT

OPEN FILE

GEOPHYSICAL TEST HOLE,
GEOTEST 1, WINNELLIE



BY
J.E. LAU



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Department of Mines and Energy

GS 81/6

N.T. GEOLOGICAL SURVEY TECHNICAL REPORT GS 81/6

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DEPARTMENT OF MINES AND ENERGY

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1. Summary

A geophysical test hole drilled at Winnellie penetrates 9 m of mudstones of the Darwin Member of the Bathurst Island Formation and 143 m of underlying pyritic shales of the Lower Proterozoic Wildman Siltstone. Originally drilled to 152 m total depth, the hole has fallen in to 106 m, that is 4.7 m below the bottom of the casing.

2. Introduction

A 152 m diamond hole was drilled in 1979 by the Department of Mines and Energy Longyear 44 for use in testing downhole geophysical logging gear. The hole was cased to 101.3 m with BX casing and left open from 100 m to total depth (152 m). It has since fallen in to 106 m, 4.7 m below the bottom of the casing.

A 3 m collar of NX casing was cemented at the top of the hole with 125 mm of casing protruding above ground and a hinged cap and padlock attached to the casing top. Standing water levels fluctuate between 7.1 m (February 81) and 13.07 m (November 79) below collar.

The entire 152 m section was fully cored and core is stored at the Core Library, Winnellie. A gamma log was run downhole.

3. Geology

The Wildman Siltstone of Lower Proterozoic age consists in this hole of thinly (5-10 mm average thickness) interbedded light and dark grey shale weathered red (to maghemite in places) along beds and joints to a depth of 86.3 m.

Below 86.3 m the shale is strongly pyritic. Dips of bedding range from 30° to 45° to core normal and schistosity cuts bedding at angles ranging between 60° and 85°. Joints are generally nearly vertical and bedding offsets of 10 mm occur along some joints.

Veins of quartz and siderite infill some joints. Pyrite occurs both syngenetically in beds and epigenetically along some veins crosscutting the beds.

Gamma counts range from 20 to 44 (average 34) counts per second inside steel casing.

An assay of pyritic shale from 112 m (Table 1) indicates that pyrite is the only sulphide present in quantity.

The Darwin Member of the Bathurst Island Formation of Lower-Middle Cretaceous age consists in this hole of white mudstone poorly bedded but mainly subhorizontal.

Joints dip at 0°, 30°, and 60° respectively to core normal. Red and yellow iron staining is generally concentrated along joints except in the interval 4.23 - 7.10 m where it is concentric.

The mudstone is sandy in the intervals 3.70 - 4.23 m and 7.10 - 9.10 m respectively. In the upper interval fine to medium-grained sandstone occurs as subvertical wispy unjointed masses in jointed mudstone; joints dip at 60° to core normal. Poorly sorted fine to coarse-grained quartz sand and clay ? intraclasts 1 to 2 mm diameter occur at the base of the section. Gamma counts are low ranging from 4 to 8 counts per second inside steel casing.

4. Hydrogeology

Water was noted to stand in the hole after completion and standing water levels have been measured intermittently since then (Table 2). Because no circulation loss or water inflow was noted during drilling the aquifer is not definitely known.

5. Conclusions

Because the hole is effectively fully cased it is useful only for testing radiometric tools.

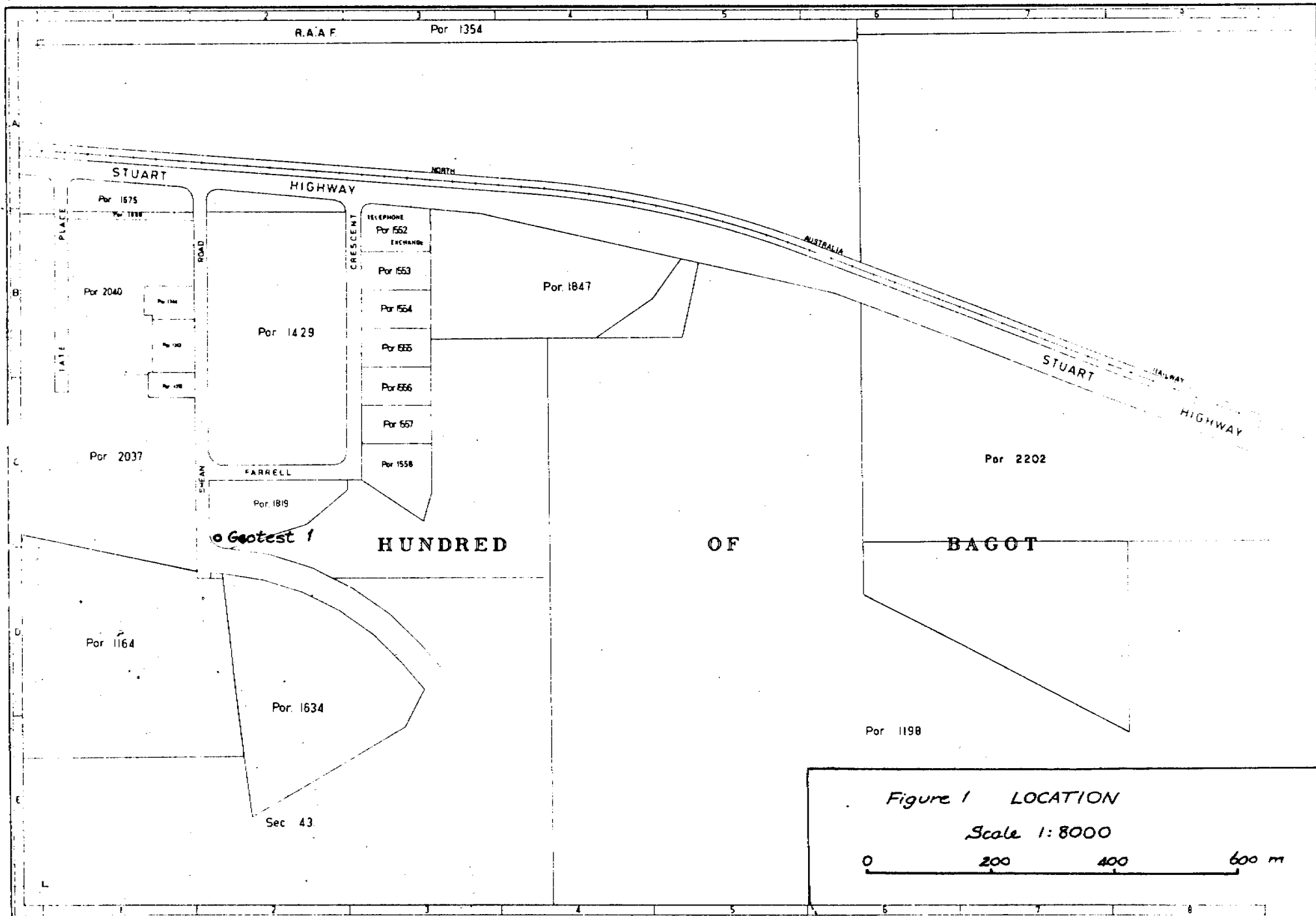
Sample Number	Lab. Register Number	Cu ug/g	Pb ug/g	Zu ug/g	Ag ug/g	Au g/t
Geotest 1 112.0 m	G81/72	70	20	160	< 2	< 0.2

Table 1: Assay results

Date	Standing water level (m. below collar)
13.11.79	13.07
3. 1.80	9.94
12. 6.80	11.50
16. 2.81	7.10
24. 2.81	7.63

Table 2. Standing water levels

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Gamma ray
TD 428

DARWIN
MEMBER
BATHURST
ISLAND
FORMATION

REFERENCE



Mudstone



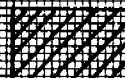
Mudstone breccia



Sandy mudstone



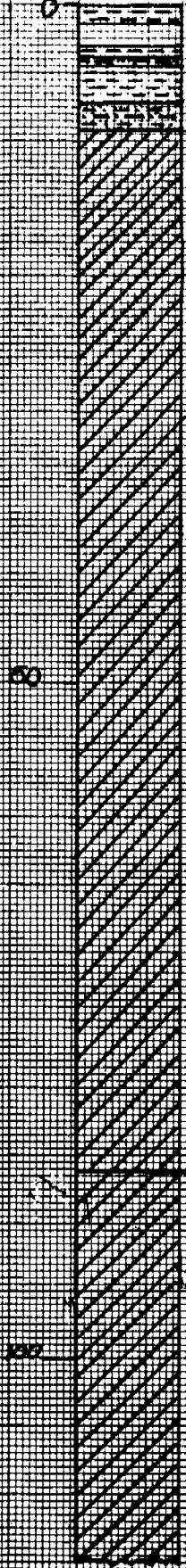
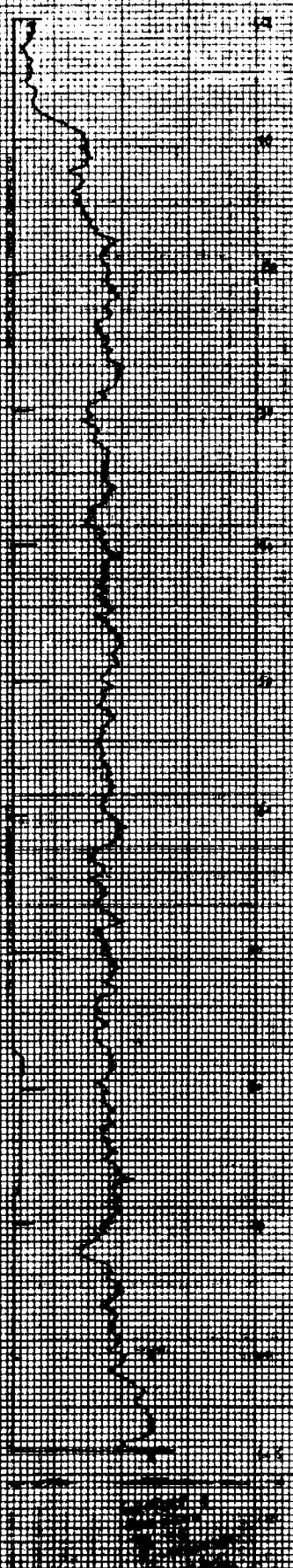
Weathered shale



Shale



Casing shoe



50

100

TD 156m

Vertical scale
1:500

FIGURE 2

COMPOSITE LOG + SECTEST 1

APPENDIX 1 DIAMOND DRILL LOG

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NT GEOLOGICAL SURVEY
DIAMOND DRILL LOG

Hole name: Geotest #1
 Location: Farrell Creek, Winnellie
 Angle: Vertical
 Collar Bl.:
 Date drilled: 5/9/79 - 21/9/79
 Driller: W. Maurer
 Rig: Longyear 40
 Company: Dept. of Mines & Energy

1:100,000 Sheet: Darwin
 Grid reference: EM 065218

DEPTH m	DESCRIPTION	LOG	% REC'D ERY	GAMMA LOG
0	MUDSTONE white, finely flecked red, hard, red & white staining & iron stain, vugs at 0-15 m, grains at 0-5 m. Ten strongly red & yellow stained.		45	
5	MUDSTONE BRECCIA, white-red & yellow stained from 40 to 60 m. joints: subvertical wavy bands of fine-medium grained white mudstone, unjointed, micaceous appearance.		30	
10	Mudstone, red & white concentric banding with fine K&T markings throughout, but concentrated in white cores of bands, bedded vertically, the result, red staining away from joints at 30-40 m.		100	
15	SANDY MUDSTONE, white, some pink controlled, red, grains poorly sorted fine coarse angular rounded, purple sandy rounded lumps 1-2 mm diam clay with no sand & some banding.		100	
20	SHALE, interbedded grey red, soft, fine micaceous, scattered fine (1-2 mm) vugs (rather fine) along red bedding planes at 25 m, cross cutting untransformed joint at 15 m top at 10 m, yellow purple clay at 20-25 m, pink green druse at 25-30 m, bedding at 25-30 m along joint, at 25-40 m, at 10-15 m, somewhat horizontal bedding with untransformed joints at 15 m, bedding in sandstone & at 20-25 m, untransformed or well back.		95	
25			100	
30			100	
35			100	
40			100	
45			100	
50			100	
55			100	
60			100	
65			100	
70			100	
75			100	
80			100	
85			100	
90			100	
95			100	
100			100	

Logged by J.E. Lam

Sheet 1 of 4

DEPTH M	DESCRIPTION	LAS	% RECON ERY	GAMMA LOG
	Joints 15° TN 60° to bedding iron stained to 1 cm diam at 10.5		90.5	
			89	
			88.5	
			88	
			87.5	
			87	
50	Bedding 30° TN at 52.5		86.5	
			86	
			85.5	
			85	
	Bedding 40° TN, iron stained beds containing magnetite stain of goethite staining down joint 1/8 inch wide at 60		84.5	
60	Beds brown iron stained 1/3 cm thick at 59.5		84	
			83.5	
			83	
			82.5	
			82	
			81.5	
			81	
			80.5	
			80	
70	Bedding 45° TN, crosscutting joint 25° TN (60° bedding) at 70		79.5	
			79	
			78.5	
	Bedding 30° TN, bed 4 mm thick magnetite iron stained joints 45° to bedding at 70		78	
			77.5	
			77	
	Bedding 30° TN, schistosity 45° to bedding, iron stained to 20 mm depth, dark to light gray, light gray to iron stained in joint, iron stained joints schistosity 45° to bedding, thin black with 2 mm diam magnetite schistosity 45°		76.5	
80	Bedding 30° TN, iron stained to 20 mm depth schistosity 45° to bedding at 80		76	
	Bedding 45° TN, iron stained to 20 mm depth schistosity 45° to bedding at 80		75.5	
			75	
			74.5	
			74	
	Bedding 45° TN, iron stained to 20 mm depth schistosity 45° to bedding at 80		73.5	
			73	
			72.5	
			72	
			71.5	
			71	
90	Bedding 45° TN, iron stained to 20 mm depth schistosity 45° to bedding at 90		70.5	
			70	
			69.5	
			69	
			68.5	
			68	
			67.5	
			67	
			66.5	
			66	
			65.5	
			65	
			64.5	
			64	
			63.5	
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			49.5	
			49	
			48.5	
			48	
			47.5	
			47	
			46.5	
			46	
			45.5	
			45	
			44.5	
			44	
			43.5	
			43	
			42.5	
			42	
			41.5	
			41	
			40.5	
			40	
			39.5	
			39	
			38.5	
			38	
			37.5	
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			36.5	
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			31	
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			14	
			13.5	
			13	
			12.5	
			12	
			11.5	
			11	
			10.5	
			10	
			9.5	
			9	
			8.5	
			8	
			7.5	
			7	
			6.5	
			6	
			5.5	
			5	
			4.5	
			4	
			3.5	
			3	
			2.5	
			2	
			1.5	
			1	
			0.5	
			0	



Logged by J.E. [unclear]

Sheet 2 of 2

DEPTH
M

DESCRIPTION

LOG

%
RECON
ERY

GAMMA LOG

DEPTH (M)	DESCRIPTION	LOG	% RECOVERY	GAMMA LOG
98			107	
99			105	
100			107	
101			105	
102			150	
103			106	
104			103	
105			100	
106			101.25	
107			102	
108			101.30	
109			98	
110			102.40	
111			103	
112			102.80	
113			102.20	
114			100	
115			101.50	
116			97	
117			102.20	
118			101.80	
119			100	
120			100.20	
121			100.50	
122			100	
123			100	
124			100	
125			100	
126			100	
127			100	
128			100	
129			100	
130			100	
131			100	
132			100	
133			100	
134			100	
135			100	
136			100	
137			100	
138			100	
139			100	
140			100	
141			100	
142			100	
143			100	
144			100	
145			100	
146			100	
147			100	
148			100	
149			100	
150			100	
151			100	
152			100	
153			100	
154			100	
155			100	
156			100	
157			100	
158			100	
159			100	
160			100	

DURIOUS SHALE gray, purple in beds 5mm thick, bedding 30° TEN, jointing 30° TEN (60° to bedding), chlorite in joints at 98.0

bedding 30° TEN, jointing 60° to bedding at 107.35

Bedding 30° TEN, joint 60° to bedding with irregular quartz siderite; pyrite interbed displaced along joint, some remobilization and coarsening of pyrite along veins from beds 120m - 65 70 } gnl forms 85 to 100m N100E 20 S

shale, gray, bedding 30° TEN at 117.5

calcite veins unmineralized parallel to schistosity (25° TEN); bedding 30° TEN at 123.5

Joint parallel to bedding at 125.55 to 126.20

Bedding 30° TEN; schistosity 65° to bedding, 128.25

Bedding 30° TEN; jointing filled with siderite & quartz 65° to bedding; pyrite interbed displaced along joint, some lensing of bed at 130.40 thin section

Bedding 30° TEN; longitudinal veins (after pyrite) parallel to schistosity (25° TEN, 30° to bedding) at 137.35

Handwritten scribbles on the right margin.

DEPTH m.	DESCRIPTION	LOG	% RECOVERY	SAMPLES
			61	
			148	
			96	
			100	
150	PYRITIC SHALE, grey, interbeds pyrite 3 mm width, trace chalcopyrite, bedding 30° NW, black micaceous carbonaceous veins than in shales.		95	

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Sheet 2 of 2

APPENDIX 2 PETROGRAPHIC DESCRIPTION

GEOTEST 1 130.00 m

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Binocular examination of thin section shows dark grey/light grey colour banding and network of fine veins. No pyrite seen.

Petrographic examination shows muscovite - quartz siltstone, with colour banding due to variations in content of dusting by black opaque ? carbonaceous matter. Well developed orientation of muscovite defines a cleavage approximately 60° to bedding/banding.

≈ 60%	quartz silt	0.01-0.03 mm angular grains commonly with tabular shapes, aligned with mica orientation.
35%	muscovite	0.01-0.02 mm flakes with $\delta = 0.040$; good orientation of most grains but some show random orientation.
5%	? dolomite	brownish grains about 0.08 mm diam.; high δ and corresponding high change in relief; intergrown with some muscovite; evenly distributed throughout slide.
1-5%	? carbonaceous matter	rock is dusted throughout with very fine opaque matter thought to be carbonaceous; content about 1% in bulk of rock, rising to about 5% in dark grey bands.
1%	unidentified grains	fairly coarse about 0.3 mm diam.; pale grey under binocular microscope; altered and slightly opaque under petrographic examination; accompanied by some distortion of cleavage.

≤ 1% tourmaline
 silt

1% veins initially quartz and
 minor chlorite, followed
 later by ? dolomitic
 carbonate.

NAME: CARBONACEOUS & DOLOMITIC METASILTSTONE

G.C. LAU