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REPORT ON

DIAMOND DRILLING

ABBEY CLAIM GROUP

WATSON LAKE M.D. - CLAIM SHEETS 105I/12 & 105J/9

LATITUDE 62°40 LONGITUDE 129°56'

FOR

ITSI JOINT VENTURE

R.J. CATHRO, B.A.Sc.,P.Eng.

JUNE 30, 1980

090646

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

$ 79,600.00

[signature]

[illegible] of

Recorder

Considered as representation work under Section 53 (a) Yukon Quartz Mining Act.

G. R. BAXTER
Supervising Mining Recorder

[signature]

Commissioner of Yukon Territory

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FIGURES

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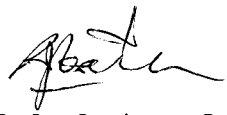
SUMMARY

A diamond drilling program was conducted on the Abbey claim group between April 9 and May 10, 1980 and consisted of 624.5 m (2049 ft.) in 4 holes. The drilling confirmed that the stratigraphic unit hosting the Howards Pass deposits, the Ordovician-Silurian Howards Pass Formation, extends along strike through the Abbey claim group, where it thickens as the Abbey Sub-basin. The holes tested conductive zones on three drill sections (grid lines 1600W, 5600W, and 11600W) but encountered only unmineralized graphitic and siliceous mudstone.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES LIMITED,



R.J. Cathro, B.A.Sc., P.Eng.

INTRODUCTION

The Abbey claim group was staked in 1977 by Archer, Cathro & Associates Limited on behalf of Itsi Joint Venture (St. Joseph Exploration Ltd., Union Oil Co. of Canada Ltd. and Aquitaine Company of Canada Ltd.). It was staked over the strike extension of an Ordovician to Devonian age black shale (Howards Pass Formation) that hosts important stratiform zinc-lead deposits (XY and Anniv) on the adjacent property of Placer Development and U.S. Steel (Howards Pass property).

Previous work on the Abbey claims has consisted of geological mapping and geochemical sampling in 1977, and EM surveys in 1978 and 1980 (Cathro, 1978a and 1978b). This work identified the position of the favourable black shale unit under an extensive overburden and vegetation cover for a length of about 18 km along the floor and lower slopes of a wide valley. In addition, it had shown the presence of strong EM conductors within the shale, which were interpreted as being caused, in part, by carbonaceous graphitic horizons. These EM conductors were considered as valid exploration targets because the Howards Pass deposits are associated with carbonaceous portions of the shale unit. The 1980 drill program was conducted to test these EM conductors for zinc-lead content and provide needed stratigraphic information. Since only four holes were drilled on three sections, the 1980 program can be only considered as the first stage in ongoing exploration of the belt. This report does not discuss the geophysical survey.

Because the mineral potential of the Abbey claim group is based primarily on its stratigraphic similarity and strike relationship to the Howards Pass property, and because the Howards Pass deposits are in many ways unique, the Abbey program depends heavily on correlation with these deposits. This report draws heavily on detailed stratigraphic studies on the Howards Pass property that form part of a

recently completed Ph.D. thesis at the University of B.C. by John Morganti, (Morganti, 1979).

LOGISTICS

The drilling was performed by Amity Drilling Ltd. of Whitehorse, using a Longyear 34 machine. The drill was airlifted by ski-equipped DeHavilland Otter and Pilatus Porter aircraft from the Canol Road to Cominco Lake, and by Hughes 500C helicopter between drill sites. Geographic locations for the 1980 holes are listed below and plotted on Figure 1 (in pocket).

Hole	Start	Finish	Location (m) N	Location (m) W	Dip	Collar Elevation (ft.)	Azimuth	Depth (m)	Depth (ft)
80A1	April 9	April 21	418N	5604	-60	4370	035	198.5	651
80A2	April 23	April 26	057S	1581	-60	4100	032	103.0	338
80A3	April 26	May 4	025N	1610	-50	4125	032	202.5	665
80A4	May 6	May 10	584S	11586	-60	4500	032	120.5	395
								624.5	2049

The holes were drilled NQ size (4.8 cm or 1 7/8 inches core diameter) except when forced by bad ground conditions to reduce to BQ size (3.7 cm or 1 7/16 inches core diameter) for the last 24.5 m (80 ft) of Hole 1 and the last 137.0 m (450 ft) of Hole 3. As shown below, all holes flattened substantially, which is normal in sedimentary rocks:

Hole	Dip	
	Collar	Bottom
1	-60	-33
2	-60	-47
3	-50	-14
4	-60	-40

Horizontal deflection was not measured.

Core recovery was fairly good except in occasional thin fault zones. Productivity was only average. It was poorest in the relatively hard, siliceous shale in Hole 1 but was improved subsequently by changing to a different type of diamond bit. Extra contractor charges above the contract footage price consisted mainly of waterline maintenance, mud mixing and washing cave. These charges were normal and not excessive. The only delays were for frozen waterlines on two occasions and waiting for parts in connection with one mechanical problem. The waterlines ranged from 1200 m with two coil stoves for Hole 1, to 125 m with one stove for Holes 2 and 3, to 1000 m with 3 stoves for Hole 4. The coil stoves were fueled with propane and consumed sixty 100 lb bottles during the drill program.

The drilling was supervised by senior geologist Uwe Schmidt, assisted by Grant Abbott (for 4 days) and Mike Phillips (in Whitehorse) under the overall supervision of the writer.

The core is stored at the DIAND core library in Whitehorse.

A Hughes 500C helicopter was chartered from Trans North Turbo Air, Whitehorse and was based at the Cominco Lake camp throughout the job. A total of 126.1 hours were flown, of which 29.7 hours were applied to linecutting and geophysical surveys, 61.3 hours were flown in support of drilling, and 35.1 hours were required for drill mobilization and demobilization.

CLAIM STATUS, LOCATION AND ACCESS

The Abbey claim group is a contiguous, rectangular block of 198 claims oriented northwest along the regional trend. Prior to the filing of this report for assessment credit, the expiry dates and other claim details were as follows:

Claims	No.	Tag Numbers	Expiry Date
Abbey 1-99	99	YA20951-YA21049	13 July, 1980
101	1	YA21051	13 July, 1980
103	1	YA21053	13 July, 1980
105	1	YA21055	10 April, 1981
107	1	YA21057	10 April, 1981
109	1	YA21059	10 April, 1981
111	1	YA21061	10 April, 1981
113-128	16	YA21063-YA21078	13 July, 1980
136-185	50	YA21086-YA21135	13 July, 1980
187	1	YA21137	13 July, 1980
189	1	YA21139	13 July, 1980
191	1	YA21141	13 July, 1980
193	1	YA21143	13 July, 1980
195	1	YA21145	13 July, 1980
197	1	YA21147	13 July, 1980
199	1	YA21149	13 July, 1980
201-216	16	YA21653-YA21668	5 August, 1980
217-220	4	YA54463-YA54466	10 April, 1981
	198		

The property is centered at latitude 62°40'N and longitude 129°56'W, straddling the boundary between claim sheets 105I/12 and 105J/9, as shown in Figure 1 (in pocket). Cominco Lake is approximately 170 km by air northeast of Ross River and 73 km east of the Twin Creek airstrip on the North Canol Road.

REGIONAL GEOLOGY

The preliminary geology of the claim group has been described and discussed in previous assessment reports on the property by the writer (Cathro, 1978a and 1978b). In summary, a southwesterly-dipping sequence ranging from Cambro-Ordovician to Upper Devonian-Mississippian in age trends northwesterly through the property. It is bounded on the northeast side by a normal fault that strikes sub-parallel to the formational trends. This fault juxtaposes Devono-Mississippian rocks on the northeast side against Cambro-Ordovician rocks on the southwest side. This fault is an important structure that crosses the normal regional structural trend at a shallow angle. Morganti believes that the belt of rocks passing through the Howards Pass property and Abbey group can be traced for a total length of 220 km to Flat Lakes at a trend of 300°, as shown on Figure 2 on the following page.

Table 1 on page 7, which is modified slightly from Morganti's Table III-1, p 92, shows the stratigraphic units recognized on the Howards Pass property to the southeast. For uniformity, this report will attempt to correlate the Abbey geology with Morganti's section.

PERIOD	Howards Pass Property (after Green et al, G.S.C., 1967)		Regional units which correlate with the local section, some of which meet group requirements
PENNSYLVANIAN			
MISSISSIPPIAN			
	13b-3	CHERT PEBBLE CONGLOMERATE	
	13b-2	VARA PEAK FORMATION	BARN GROUP — Black Clastic Group
DEVONIAN	13b-1	IRON CREEK FORMATION	
	10c	UPPER CHERT FORMATION	
	10b	FLAGGY MUDSTONE FORMATION	
SILURIAN	10a	HOWARDS PASS FORMATION	ROAD RIVER FORMATION (GROUP)
ORDOVICIAN			
	7b-3	TRANSITION FORMATION	RABBITKETTLE FORMATION (GROUP)
	7b-2	WAVY BANDED LIMESTONE FORMATION	
CAMBRIAN	7b-1	MASSIVE LIMESTONE FORMATION	
	7a	LOWER SILTSTONE UNIT	SEKWI FORMATION
HADRYNIAN	2	'GRIT UNIT'	'GRIT UNIT'

Table 1. Table of Formations, Howards Pass Property, (after Morganti, 1979, Table III-1, p 92).

According to Morganti, all zinc-lead mineralization on the Howards Pass property is contained within the Howards Pass Formation, a black shale member that, together with his Flaggy Mudstone Formation, is generally referrred to in regional exploration throughout Selwyn Basin as the Road River Formation. The Howards Pass Formation consists of a homogeneous sequence of carbonaceous and siliceous mudstone that were laid down slowly and quietly in deep-water conditions within a starved basin. This "black shale" sequence displays local thickening, which Morganti terms "sub-basins", along the base of slope parallel to the edge of a carbonate platform that lay to the northeast (Figure 2). This local thickening is interpreted as following an older regional lineation, possibly related to a fault-bounded trough.

The zinc-lead mineralization occurs in the sub-basins within a distincitve cyclical unit of intercalated carbonaceous mudstone, limestone and chert that Morganti has termed the "Active Member". Work to date on the Howards Pass property has outlined three deposits, or sub-basins, named from southeast to northwest XY, Anniv and OP. Their location relative to the Abbey claims is shown on Figure 2.

The Howards Pass mineralization differs from other shale-hosted deposits in the Selwyn Basin in showing virtually no mineral zoning, alteration, or obvious spatial relationship to a geothermal or hydrothermal system. Sphalerite and galena have apparently precipitated as sedimentary intercalations with the other rock constituents and, except for the presence of the sulphide minerals, the mudstone hosting the deposit is indistinguishable from Road River carbonaceous mudstone elsewhere in the Selwyn Basin.

The Howards Pass deposits are associated with a strong organic carbon (graphite) content, which is generally interpreted as indicating the presence of decaying

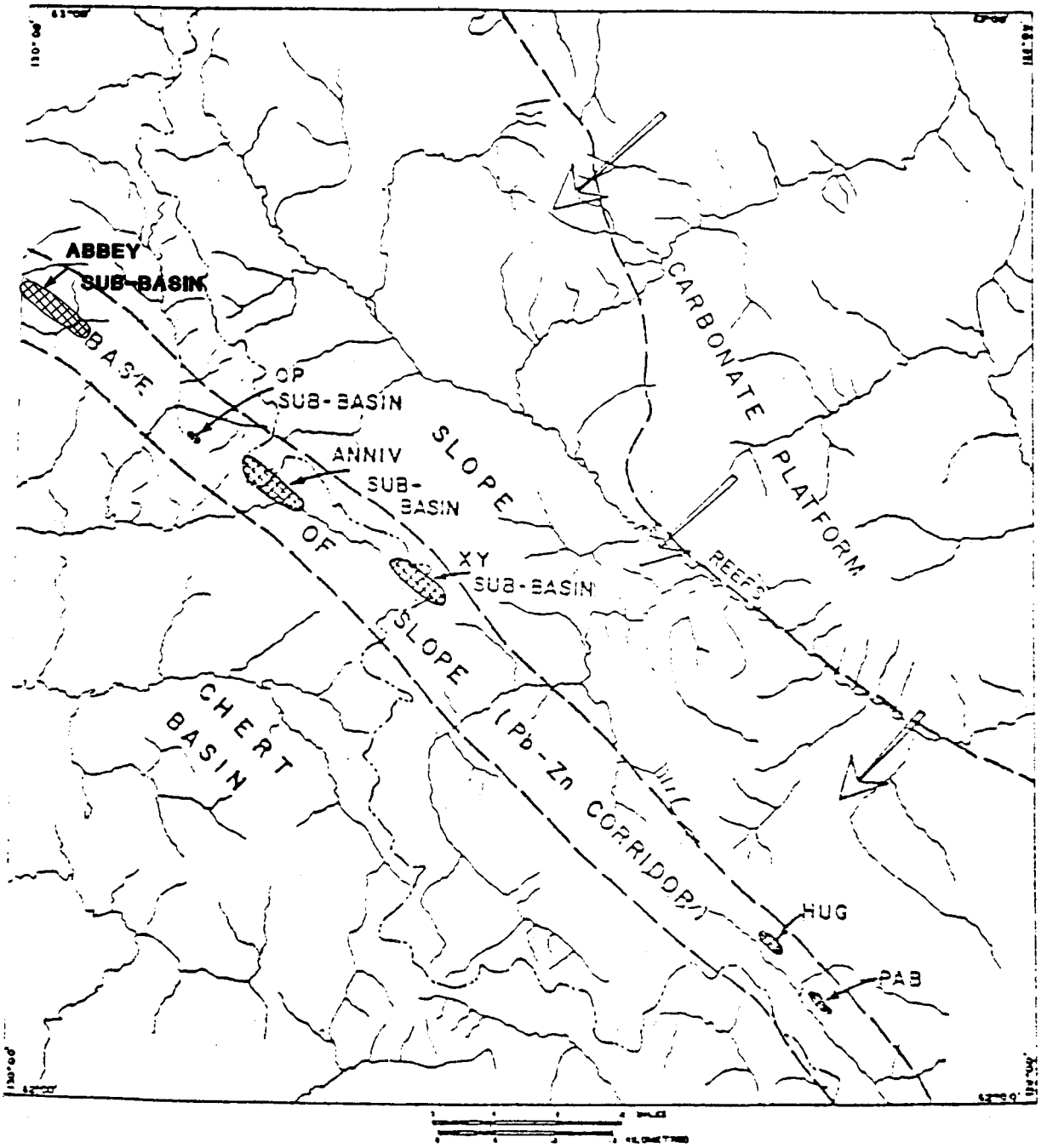
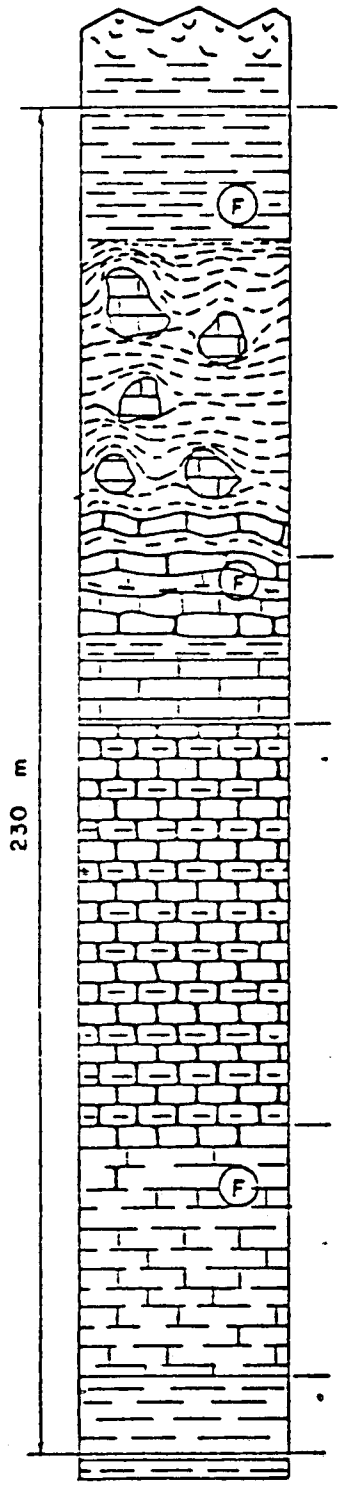


Figure 2. Lithofacies time-slice interpretation for the eastern Selwyn Basis during deposition of the Howards Pass formation in the Nahanni map-area. Arrows indicate the direction of sediment transport.
(from Morganti, 1979, Figure III-3, p 100)

organic matter. This probably served as a nutrient source for bacterial reduction of sulphate in seawater during diagenesis. The graphite produces strong EM conductors. Figures 3 to 5 on the following pages are detailed stratigraphic sections for Morganti's three subdivisions of the "Road River Formation".



10b (flaggy mudstone formation)

10a-5 (upper siliceous mudstone member) - laminated, siliceous carbonaceous mudstone with abundant limestone concretions, and a graptolite zone 1 m thick occurring near the top of the member.

10a-4 (active member) - intercalated mudstone, limestone and chert with economically significant amounts of Zn and Pb with a poorly preserved graptolite horizon.

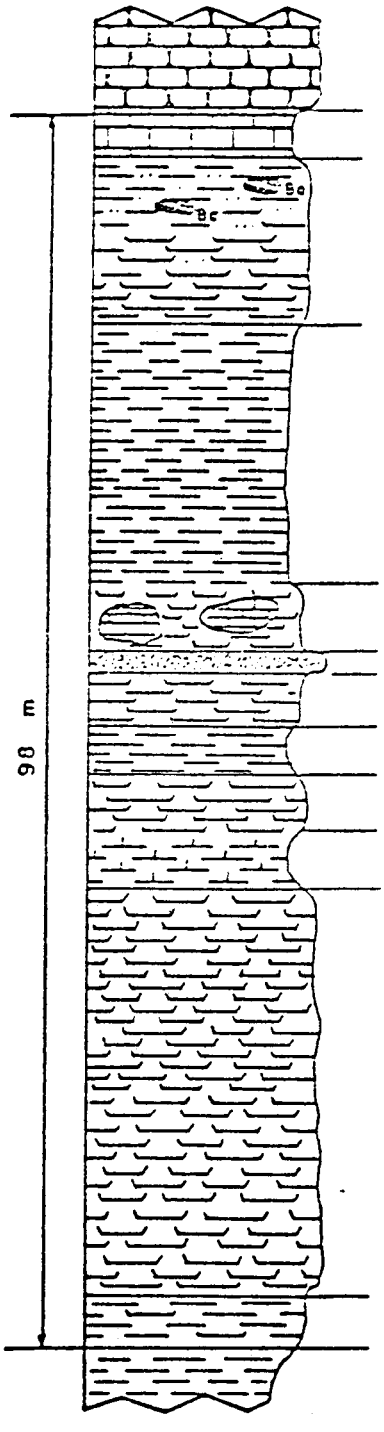
10a-3 (lower cherty mudstone member) - massive, carbonaceous siliceous mudstone with blocky fracture and up to 12% $C_{(org)}$.

10a-2 (calcareous mudstone member) - calcareous carbonaceous mudstone with 0.2 m graptolite zone.

10a-1 (pyritic silceous shale) - siliceous carbonaceous fissile shale with common pyrite concretions.

7b-3 (transition formation)

Figure 3. Composite stratigraphic section of the Howards Pass formation showing the various members. (From Morganti, 1979, Figure 11-8, p.30)



Upper chert formation, containing calcareous, carbonaceous chert with clay clasts.

Carbonaceous fetid limestone with abundant burrows.

Intercalated carbonaceous mudstone and non-carbonaceous mudstone with local siltstone lenses containing barite concretions.

Dark grey, carbonaceous mudstone, laminae are 0.5 to 3 cm thick.

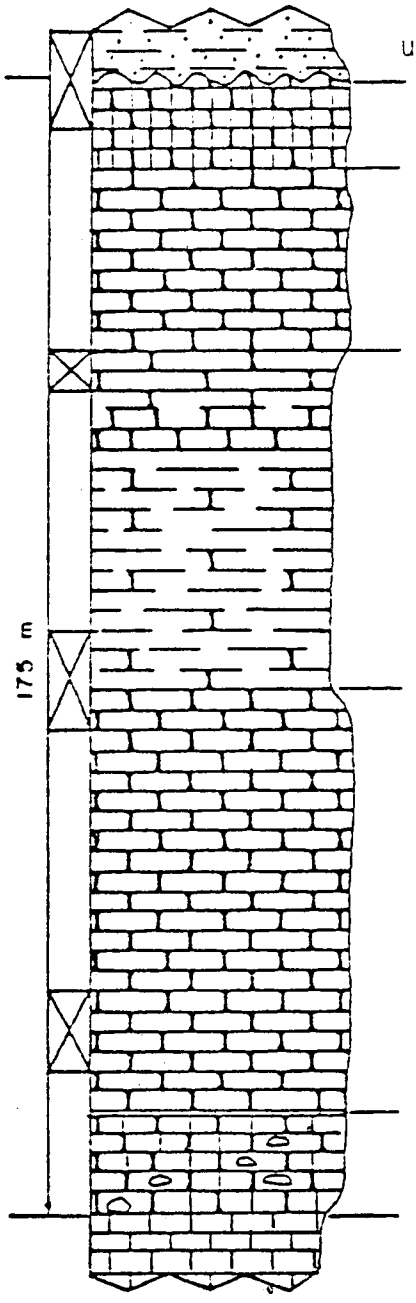
Intercalated laminae of carbonaceous and non-carbonaceous mudstone.
Buff weathering quartz-muscovite siltstone.
Intercalated laminae of carbonaceous and non-carbonaceus mudstone.
Laminated, carbonaceous mudstone.
Intercalated carbonaceous and non-carbonaceous mudstone.
Slightly calcareous, carbonaceous and non-carbonaceous mudstone.

Intercalated laminae of carbonaceous and non-carbonaceous mudstone.

Laminated, carbonaceous mudstone.

Howards Pass formation - upper siliceous mudstone member, laminated carbonaceous mudstone.

Figure 4. Composite stratigraphic section for the flaggy mudstone formation. (From Morganti, 1979, Figure 11-20, p.61)



Iron Creek formation - massive carbonaceous mudstone to siltstone.

unconformity

Upper chert containing carbonaceous chert with beds ranging from 2 to 10 cm, but is locally massive.

Siliceous carbonaceous mudstone with cherty mudstone occurring locally. Minor bulbous flute casts are present in silty portions.

Lower chert containing carbonaceous chert with beds ranging from 2 to 10 cm thick.

Slightly calcareous, carbonaceous chert with clay clasts locally.

Flaggy mudstone formation (fetid limestone unit) containing dark grey fetid limestone with abundant burrows.

Figure 5. Composite stratigraphic section for the upper chert formation. (From Morganti, 1979, Figure 11-23, p. 69).

GEOLOGY OF THE ABBEY CLAIMS

The geology as previously mapped from the limited outcrop near the claims is shown on Figure 1 (in pocket), together with the 1980 hole locations and the geophysical grid.

As mentioned previously, the four holes drilled in 1980 tested EM conductors interpreted to be underlain by the Howards Pass Formation. Cross-sections through the four holes are plotted on Figures 6 to 8 inclusive on the following pages. A tentative stratigraphic correlation is shown on Figure 9, on page 18. Drill hole logs are appended at the end of this report.

Hole 89A1 was collared about 125 m horizontally from and drilled towards the interpreted contact of the Rabbitkettle Formation limestone on Line 5600W. It intersected a calcareous mudstone that is correlated with Morganti's calcareous mudstone member (10a-2). At about 122 m (400 ft), it passed into a pyritic, siliceous shale that correlates well with Morganti's unit 10a-1. No repetition of the section was observed and the base of the Howards Pass Formation was not reached. The section cut in this hole is apparently at least 150 m thick, which is thicker than the equivalent section reported by Morganti on the Howards Pass property.

Hole 80A1 tested part of the interpreted EM conductor on this line, as shown on Figure 6. A second hole was planned for this line, to be collared at about 225N, but this hole had to be deferred for budgetary reasons. That hole is still necessary to test the upper part of the Howards Pass Formation and the main part of the conductor.

Holes 80A2 and 80A3 were drilled on Line 1600W to test a strong conductor near Cominco Lake. The initial hole on this section (2) was collared in the

FIGURE 6

ARCHER, CATHRO & ASSOCIATES LTD

MAXMIN EM PROFILES AND DRILL SECTION - HOLE 80A1

LINE 5600W

ABBEY CLAIMS

ITSI JOINT VENTURE

To accompany report dated June, 1980

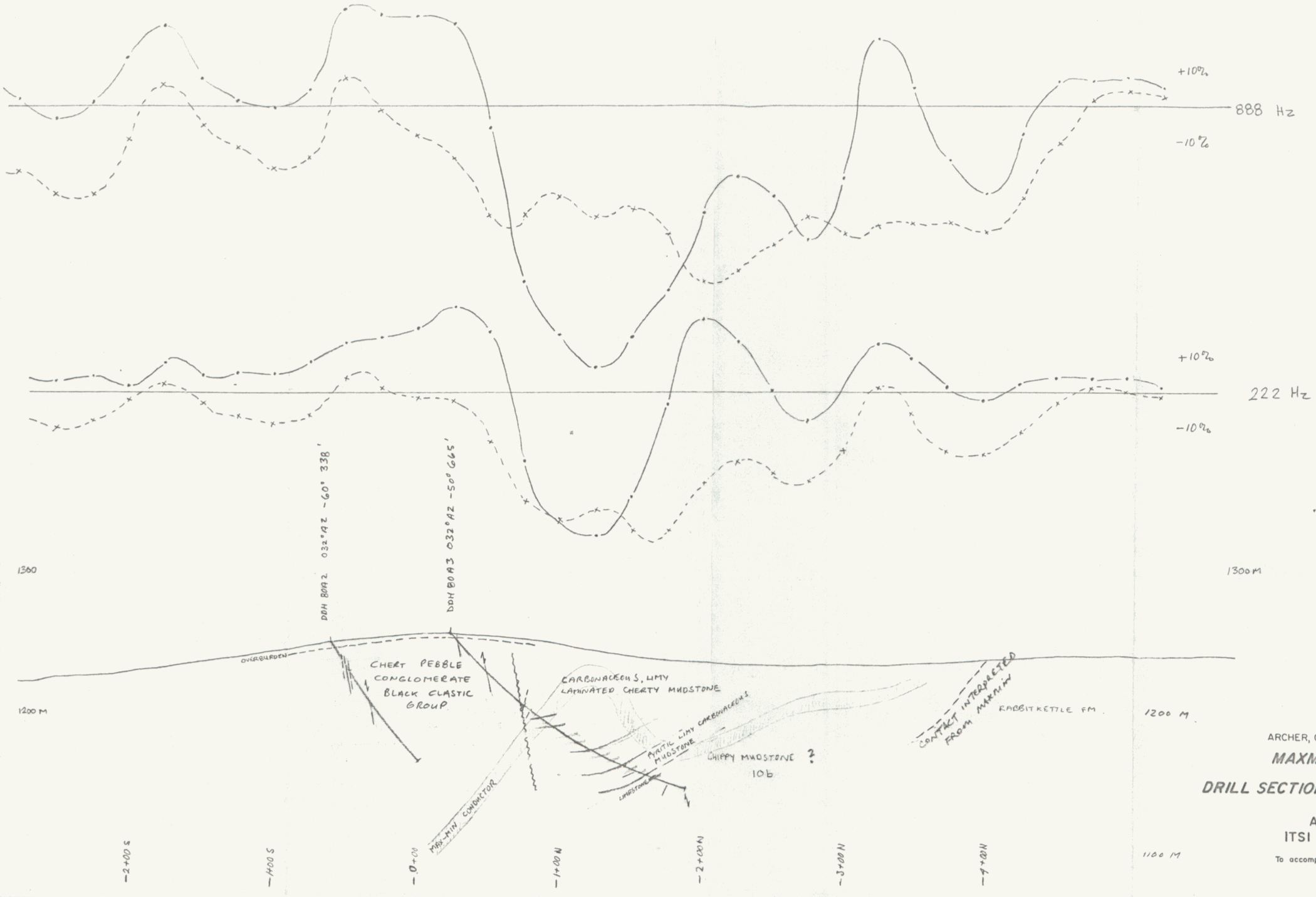


FIGURE 7

ARCHER, CATHRO & ASSOCIATES LTD

MAXMIN EM PROFILES AND DRILL SECTION - HOLES 80A2, 80A3

LINE 1600W

ABBEY CLAIMS

ITSI JOINT VENTURE

To accompany report dated June, 1980

+10%
888 HS
-10%

+10%
222Hz
-10%

5+89 S - 115+86W
4500 032° AZ -60°

ELEVATION
1400 M

CHIPPY MUDSTONE
ORANGE WEATHERING MEMBER

HOWARDS PASS FM.
UPPER SILICEOUS MUDSTONE MEMBER

LIMESTONE

MAX-MIN CONDUCTORS

1300M

8+00 S
7+00 S
6+00 S
5+00 S
4+00 S
3+00 S
2+00 S

INTERPRETED CONTACT FROM MAX-MIN

RABBIT KETTLE

ELEVATION
1400 M
1300 M

FIGURE 8
ARCHER, CATHRO & ASSOCIATES LTD
MAXMIN EM PROFILES AND DRILL SECTION - HOLE 80A4
LINE 11600W
ABBEY CLAIMS
ITSI JOINT VENTURE
To accompany report dated June, 1980

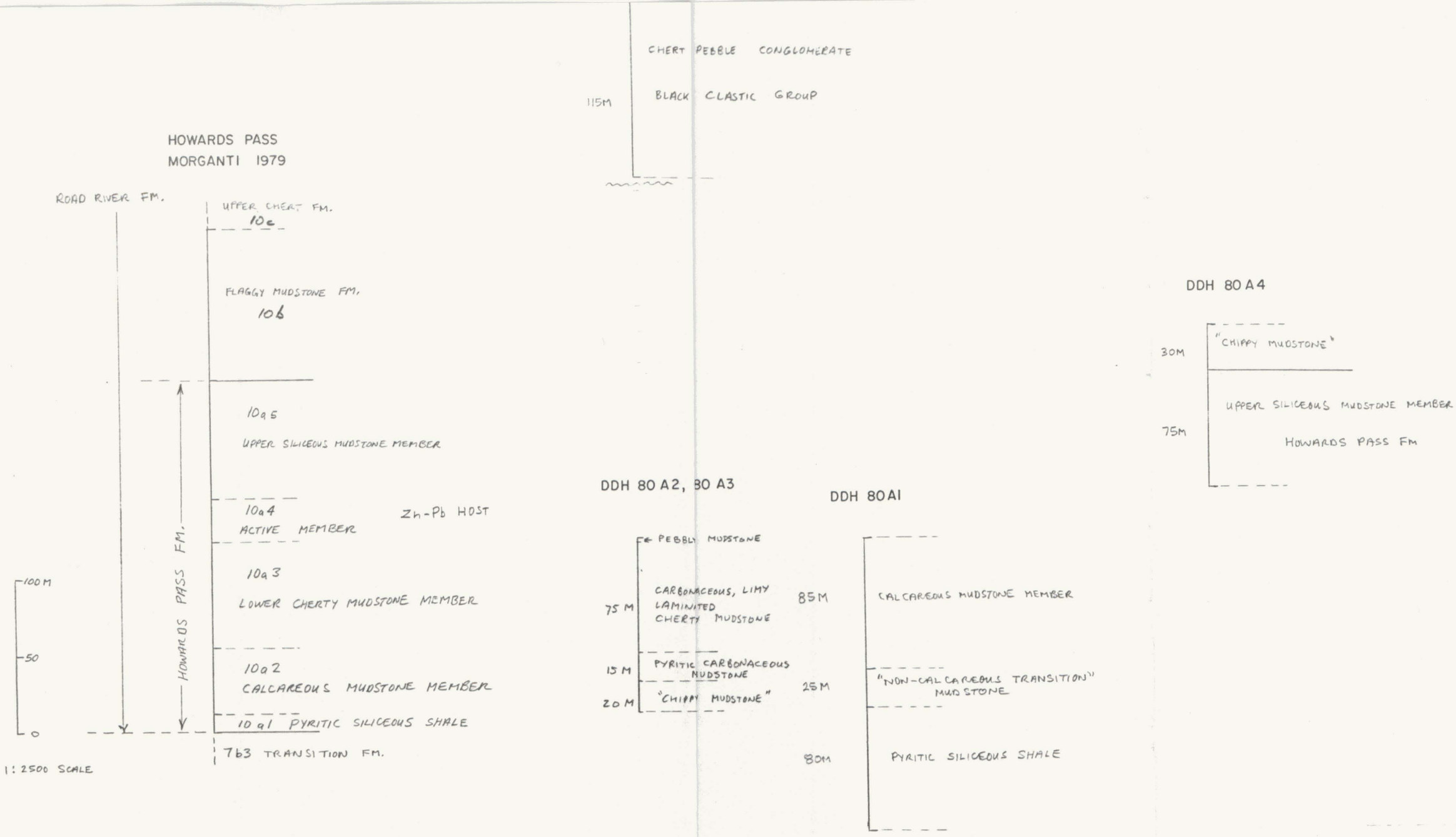


FIGURE 9

ARCHER, CATHRO & ASSOCIATES LTD

STRATIGRAPHIC CORRELATION
1980 DRILLING

ABBEY CLAIMS
ITSI JOINT VENTURE

To accompany report dated June, 1980

interpreted hanging wall of a gently-dipping conductor in order to intersect the upper part of the Howards Pass Formation and the contact with unit 10b. This was not achieved because the interpreted attitude of the conductor proved wrong (see Figure 7). Hole 80A2 and the top of Hole 80A3 intersected chert pebble conglomerate of the Black Clastic Group (unit 18b). Hole 80A3 then crossed a fault and intersected a graphitic cherty mudstone that explained the conductor. This unit can not be definitely correlated with Morgani's section but is tentatively assigned to the Howards Pass Formation.

Hole 80A4 had to be located at the northwest end of the property in order to earn assessment credit for that part of the claim group. A strong conductor on Line 11600, an area with relatively better geological control, was selected for testing. This hole collared in Flaggy Mudstone Fm. (unit 10b) and, at 35 m (115 ft),penetrated into Morganti's upper siliceous mudstone member of the Howards Pass Formation (unit 10a5), which contained enough graphite to explain the conductor, as shown on Figure 8. A second hole will be required on this line to test the lower and central portions of the Howards Pass Formation.

CONCLUSIONS AND RECOMMENDATIONS

The 1980 drilling, although inadequate to fully test the potential of the Howards Pass Formation on the Abbey claim group, failed to intersect zinc-lead mineralization. However, the drilling did show that the Howards Pass Formation extends through the Abbey group and that it is basically similar in lithology and thickness on the Abbey group as at the Howards Pass deposits. Since it is known to be less than 100 m thick where it is relatively well-exposed on a ridge between the Abbey group and the OP deposit, it is apparent that a local thickening of the

Howards Pass Formation is present on the Abbey group.

These local thicker zones, referred to by Morganti as "sub-basins", are believed by him to have an important genetic association with the mineralization that is localized within them on the Howards Pass property. Since the Abbey Sub-basin is situated on strike along the same linear belt of sub-basins hosting important deposits on the Howards Pass property, it seems reasonable to conclude that further drilling is justified on the Abbey group in future to determine if Morganti's mineralized Active Member is also present.

Since overburden in the four 1980 holes was relatively shallow and a previous soil geochemical survey of the claim group for lead and zinc failed to indicate an anomalous area, any mineralized zones on the property must either (a) fail to subcrop (blind deposits), or (b) reach bedrock surface beneath a local deep depression filled with glacial till that inhibits geochemical dispersion. Since most of the surface of the property consists of gentle, low knolls and wide shallow valleys and is heavily vegetated, the depth of overburden is impossible to estimate.

All of the 1980 core should be geochemically assayed to determine if any horizons are enriched in zinc or lead and to provide a correlation with the geochemical data, including organic carbon content provided by Morganti.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES LIMITED,

RJC/jm

R.J. Cathro, B.A.Sc., P.Eng.

References

Cathro, R.J. (1978a) Geology and Geochemistry, Abbey Claims; unpublished Assessment Report, January 15, 1978.

Cathro, R.J. (1978b) Geology, Geochemistry and Geophysics, Abbey Claims; unpublished Assessment Report, December 10, 1978.

Morganti, J.M. (1979) The Geology and Ore Deposits of the Howards Pass Area, Yukon and Northwest Territories: The Origin of Basinal Sedimentary Stratiform Sulphide Deposits; unpublished Ph.D. Thesis, University of B.C., September, 1979.

ITSI J.V. – ABBEY CLAIMS: LOG DDH 80-A1

COORD. 56+04W, 4+18N DIP -60° AZIM. 035° ELEV. 1317 m SIZE NQ STARTED Apr. 9 | 80 COMPLETED Apr. 18 | 80 LOGGED BY R.C. Caine

VISUAL LOG	FOOTAGE Intersection	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY % INTERBEDS	CORE ANGLE Bedding W	CORE ANGLE Bedding E	CORE ANGLE Structure W	CORE ANGLE Structure E	PYRITE Lam. % / Thickness	PYRITE Diss. % / Size	BARITE Bed. % / Thickness	BARITE Bleb. % / Size	CO_3 Type % / Size	OTHER % / Description	ANALYSES % ppm Pb	ANALYSES % ppm Zn	ANALYSES % ppm Cu	ANALYSES oz. ppm Ag	ANALYSES % ppm Ba
	0.0		CASING																
	23.0		U. SIL. TO CHERTY, V. CALC BLK MASSIVE ARGL, V. CARB		70 / 70				LAM Tr THIN SCATTERED				VEIN Tr 11 BDG < 3cm						
	40.0		SOS, VARIABLY CALC, NOW SLIGHTLY GRITTY		80 / 25				LAM Tr "				VEIN Tr "						
	60.0		SOS NOW V. CALC, SLIGHTLY GRITTY		20 / 10								VEIN Tr "						
	80.0		SOS MOD-V. CALC	THIN, MOD CALC, NIN-SL, V. CARB, SHAL INTERVALS < 2cm 05	10 / 10 / 05								VEIN Tr < 1cm						
	100.0		SOS NOW. V. CALC V. SIL. TO CHERTY	SCATTERED < 20cm V. CALC MDSN 05	10 / 10								VEIN Tr "						
	120.0		SOS AS ABOVE	SOS AS ABOVE 10	60 / 80		≤20						BRX 10 BRECCIA MATRIX						
	130.0		WEAKLY LAM TO MASSIVE V. SIL TO CHERTY, MOD-V. CALC. TBLK ARGL		30 / 60								BRX 05 "						
	150.0		SOS VARIABLY LOW-V. CALC.		10								VEIN Tr < 2 MM						
	170.0		SOS AS ABOVE	CALC. SLSN RIP-UP (?) @ 173.0 Tr	60 / 70 / 50				LAM Tr THIN SCATTERED				VEIN 05 < 4 CM						
	187.0		SOS AS ABOVE	V. SIL., V. CALC INTERBEDS DK GREY ARGL RHYTHMIC 10	40 / 60 / 50				LAM Tr "				VEIN Tr < 0.5 CM " BDG						
	198.0																		

CALCAREOUS MUDSTONE MEMBER - UNIT

ITSI J.V. – ABBEY CLAIMS: LOG DDH 80-A1

COORD. _____ DIP _____ AZIM. _____ ELEV. _____ SIZE _____ STARTED _____ COMPLETED _____ LOGGED BY _____

VISUAL LOG	FOOTAGE Inter-section	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY INTERBEDS %	CORE ANGLE (°) Bedding W E	CORE ANGLE (°) Structure W E	PYRITE Lam. % / Thickness	PYRITE Diss. % / Size	BARITE Bed. % / Thickness	BARITE Bleb. % / Size	CO_3 Type % / Size	OTHER % / Description	ANALYSES % Pb	ppm Pb	% Zn	ppm Zn	% Cu	ppm Cu	oz. Ag	ppm Ag	% Ba	ppm Ba
			VARIABLY LOW-V CALC, V. SIL. TO CHERTY, V. CARB BLK ARGL, THK BDD		50/60/80		LAM TR; <1MM SCATTERED				VEIN TR; <4MM											
	220.0		SOS CALC. CNT DEC D/S.		20/40		LAM TR; "				VEIN TR; "	FLT GOUGE 243.0 - 243.8										
	243.0		SOS CALC CNT VARIES FROM NON TO VERY CALC	CALC DK GREY MDSN 05; <10CM, SCATTERED	70/60						VEIN TR; <1CM											
	260.0		SOS AS ABOVE	SOS AS ABOVE 05	60						VEIN TR; <5CM											
	280.0		SOS AS ABOVE	SOS AS ABOVE. 15	50/50						VEIN 05; <5CM											
	300.0		WEAKLY LAM, MOD-V. CALC V. SIL TO CHERTY MASSIVE BLK ARGL		70						VEIN 05; <5CM											
	320.0		SOS AS ABOVE		65	80					VEIN TR; <1CM											
	340.0		SOS AS ABOVE VARIABLY CALC.	NON-CALC. GY MDSN RID-UPS? NR BASE TR	85/70						VEIN TR; <1CM											
	361.0		INTENSLY BIOT. GREY SILTY MDSN MINOR SILTY LSN <4CM	CALC BLK VFG MDSN INTERBEDS <10CM 15	80			CLOT 05; IN SILTY MDSN <1CM			VEIN TR; <0.5CM COARSE SL											
	365.0		NON-CALC, WEAK TO MOD. SIL SLIGHTLY GRITTY BLK SHAL.	IRREG CLASTS GREY SILTY LSN <3CM 05								FLT GOUGE										
	372.0		SOS AS ABOVE MINOR LSN CLASTS	GREY. SILTY LSN 375.0 - 378.0; DOUBLE OR CLASTS?	80			PATCH 05; IRREG. <3CM														
	390.5		DK GREY, MED GRND REX LSN	IRREG. THIN CALC SHAL HORIZONS 10				PATCH 05; IRREG <1CM														
	393.1																					

ITSI J.V. – ABBEY CLAIMS: LOG DDH 80-A1

COORD _____ DIP _____ AZIM. _____ ELEV. _____ SIZE NQ/BQ STARTED _____ COMPLETED _____ LOGGED BY R. C. Carne

VISUAL LOG	FOOTAGE Intersection	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY % INTERBEDS	CORE ANGLE Bedding W	CORE ANGLE Bedding E	CORE ANGLE Structure W	CORE ANGLE Structure E	PYRITE Lam. % / Thickness	PYRITE Diss. % / Size	BARITE Bed. % / Thickness	BARITE Bleb. % / Size	CO_3^- Type % / Size	OTHER % / Description	ANALYSES % Pb	ppm Pb	% Zn	ppm Zn	% Cu	ppm Cu	oz. Ag	ppm Ag	% Ba	ppm Ba
			BIOT DK GREY BRN, NON-SIL, NON-CALC SILTY MDSN	FLASER BDD NON-CALC, NON-STK GRITTY BLK SHAL					LAM Tr	DISS 1														
	400.0								<2 MM	IRREG PATCHY														
			SOS	NON-SIL, SLIGHTLY CALC, GRITTY BLK SHAL <0.8M 25	75				LAM Tr	DISS Tr				413.5-414.0, FEEDING BURROWS @ TOP SHAL BED										
	426.0								11 MDSN	SHALE MDSN														
			LOW-MOD. SIL, V. CARB, SLIGHTLY TO MOD CALC BLK SILTY MDSN	THIN FLASER 20 BDD, BIOTURB. DK GREY-BRN SILTY MDSN						PATCH Tr			VEIN Tr											
										IRREG SCATTERED			<0.5CM											
	440.0		NOW. MOD. CALC MOD-V. SIL, GRITTY BLK MDSN GRAD. CNT	SOS DEC. RAPIDLY D/S Tr	90								VEIN Tr											
													11											
	457.8		LOW-MOD. SIL, NON-CALC, GRITTY BLK SHALE	FLASER BDD 25 BRN-GREY SILTY MDSN, THIN IRREG BEDS	70								VEIN Tr											
													<2MM											
	480.0		SOS	SOS 30 IRREG LSN BODIES <20CM	90					PATCH Tr			VEIN Tr											
										IRREG <1CM			<2MM											
~~	500.6		NON-SIL, V. CARB VFG BLK SHALE, VARIABLY CALC	THIN LSN LAM <2MM Tr	60				LAM Tr	NOD Tr			BRX Tr	BADLY BROKEN NR TOP										
									DISCONT	LARGE MASSIVE <3CM			MATRIX TO BRECCIA											
	522.5		V. SIL. TO CHERTY, V. CALC, BLK MDSN	THIN LSN LAM <2MM 10	60				LAM Tr				VEIN Tr											
									IRREG DISCONT				BDG <1CM											
	525.8		V. SIL. TO CHERTY, MOD CALC BLK SHAL	"BOUDINED" 05 (SOFT SED) BLK CHRT <1CM	45				LAM 02				VEIN Tr											
									EVERY 2-3CM COARSE				11											
	540.0		SOS VARIABLY CALC	SOS 05	85				LAM 05				VEIN Tr											
									11				11											
	558.5		V. CALC. BLK VFG LOW-MOD SIL, V. CARB MDSN	THIN LSN LAM <2MM 15	90 / 85																			
	560.6																							
			MOD.-V. SIL, SLIGHTLY GRITTY BLK SHAL, SLIGHTLY CALC TO MOD CALC	BIOTURB. GRY BRN SILTY MDSN 572.5-573.0 574.1-575.0	80				LAM 05					REDUCED TO BQ @ 571.0'											
	580.0								PINSTRIPE EV. 1 CM.															

Pyritic Silt. Shale

ITSI J.V. – ABBEY CLAIMS: LOG DDH 80-A1

COORD. _____ DIP ____ AZIM. ____ ELEV. ____ SIZE ____ STARTED _____ COMPLETED _____ LOGGED BY _____

VISUAL LOG	FOOTAGE Intersection	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY INTERBEDS	%	CORE ANGLE Bedding W E	CORE ANGLE Structure W E	PYRITE Lam. % Thickness	PYRITE Diss. % Size	BARITE Bed. % Thickness	BARITE Bleb. % Size	CO_3 Type % Size	OTHER % Description	ANALYSES % ppm Pb	ANALYSES % ppm Zn	ANALYSES % ppm Cu	ANALYSES oz. ppm Ag	ANALYSES % ppm Ba
			VAR. MOD-W. SIL, MOD-V. CALC, BLK SMAL	THIN LSN LAM <1MM BIOTURB. MDSN 585.8-586.2	15	30		LAM 03	PATCH Tr			VEIN Tr						
								PINSTRIPE EVERY 1-2 CM	COARSE <2CM SCATTERED			<1MM						
	600.0		SOS AS ABOVE	SOS AS ABOVE SCATTERED <5CM BIOTURB MDSN	10	30 / 30 / 40		LAM 02	PATCH 05			VEIN Tr						
								11	11			11						
	621.4		GREY LAM'D SILTY MICRITIC LSN															
	626.9																	
			VARIABLY LAM-MOD. SIL., MOD CALC, GRITTY BLK SMAL	BIOT. GREY SILTY ARGILL MDSN 632.0-633.5	10	85		LAM Tr				VEIN Tr						
								DISCONT. EVERY 0.5-1 CM				<2 MM						
	651.0		END.	SCATTERED SMALLER INTERVALS														

JTV - ABBEY

HOLE No. 80A-1

PAGE 1 OF 11

DRILL HOLE LOG

COORDINATES 56+04W - 4+18N
ELEVATION 4320 (1317 M)
DIP - 60°
AZIMUTH 035°
SCALE

CORE SIZE NQ
HOLE STARTED APRIL 9, 80
HOLE COMPLETED APRIL 18, 80
LOGGED BY U. SCHMIDT

FOOTAGE | DESCRIPTION | MINERALIZATION | DIP

(METRES)

10

20

7 — BEDROCK

ROAD RIVER Fm — 10a-2 Calcareous mudstone marble

70
Ca 70

BLACK, GRAPHITIC, SILICEOUS, LIMY ARGILLITE
LAMINATED
MINOR MED GREY A BANDS, PYRITE BANDS 1 → 3 MM

REMOBILIZED WHITE Ca 5 - 20-40 mm // BEDDING <1mm IN HAIRLINE FRACTURES 50° TO X ON DIP FRACTURE UP TO 60° TO X 20° TO CORE

30

Ca 70° 20 mm
25°
31.5' GREY THINLY LAMINATED PYRITIC LIMY ARGILLITE BAND FROM 2 → 20 MM THICK, MAY BE DEFORMED BY SOFT SEDIMENTARY PROCESSES

40

15mm Ca 70°
∠ 80°
20° X 60° - MED GREY IRREG. LAMINATED, THIN BAND (2mm) DISS PY
10 mm Ca 70° // ⊥
50° SAME STRIKE AS BEDDING
20° SE DIP JOINT

Ca STRINGER 20 mm
Ca " 40 mm
Ca " 40 mm.

20°
20/50° GRAPHITIC SLICKENSIDES
20° G.S. graphitic slickensides
GS 40°

50

Ca
Ca
50°
Ca
25° 5 mm med grey hard soft sed def. — dark grey lens — 15 mm SULPHIDE BAND Py 40°

40 joints 40° to core 90° TO BEDDING

60

DRILL HOLE LOG

HOLE No. 80A1
PAGE 2 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

60

Ca 30°
30° X 20 G.S.
— 4 JOINTS/FT
30° ⊥ X
& 15° ∥ X .GS

ROAD RIVER Ral CONTINUED

BLACK, GRAPHITIC, SILICEOUS, LIMY ARGILLITE
COMMONLY CUT BY WHITE CALCITE FILLED FRACTURES VARYING FROM < 1mm → 40 mm.
strike of calcite stringers is 90° TO BEDDING

⊥ <10°
Ca 40° - DIP JOINT 90° BEDDING STRIKE ⊥ 15° also Ca ∥ bedding
2-3mm - x 8 hairline Ca fractures/FT.

70

- Ca vein ∥ ⊥ 0° to core
- Broken ground - curved bedding sub-∥ to core
⊥ x 10° strike joints 20° dip joint 90° to strike @ 30°

w 2 3

highly fractured core.

80

Ca 10° 90° TO BEDDING

⊥ 0 Bedding sub ∥ core axis 2-5 MM DARK GREY AND BLACK COLOUR BANDS
- Bedding steepens 10° to core axis graphitic slickensides ∥ bedding

← Ca vein sub ∥ bedding ≈ 20 mm

90

10° < 1mm sulphide bands ? Py
very fine py associated dark bands

⊥ 15° - colour banding upto 10 mm width.

5° ⊥ 100 } hairline calcite filled fractures

20°

100

0=° } graphitic slickensides

} - deformed calcite stringers

- 10°

20° } - calcite stringers ∥ bedding.

slightly lighter than normal dark grey even colored massive spotted biotite argillite

110

30° } Ca 10 MM hairline calcite filled fractures
graphitic slickensides

w ≈ 3 calcite filled fractures/ft 1 → 3mm width.

20°/0

10MM Ca vein

120

DRILL HOLE LOG

HOLE No. 80A-1
PAGE 3 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH 035°
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

120 (37) — Ca vein 60° to core; graphitic gouge; highly fractured core

Ral CONTINUED
- black, graphitic, siliceous limey argillite

30° G.S penetrative cleavage 20° calcite filled fractures ∥ both

60°? - penetrative cleavage at 20° disrupts colour banding and calcite ∥ to it

80° - med grey laminations in dark grey host

calcite and graphitic slickensides

130 (40) — HIGLY FRACTURED CORE, ABUNDANT CALCITE FILLED FRACTURES AND GRAPHITIC FAULT GOUGE

Ca — Ca vlts in open space filled fractures

190 — 1mm band of sulphide eph? 40°-core — 140

30° — 20° G.S - med grey laminations, 1mm sulphide band ∥ + grey brown, dull, soft — Ca @ 20° ⊥ sulphides — 141

10° G.S

150 — 60° highly fractured core

(47)

15°

15° STRONG PENETRATIVE CLEAVAGE @ 15° —

160 — 10°

5° — intermittent hairline fractures filled c Ca @ 40° 90° from strike of bedding

- abundant Ca filled fractures

Ca 10mm — grey lenticoid bed - pyritic black laminae, curved bedding, calcite mineral fracture filling 15 mm → 20 cm — narrow sulphide laminae — 167

170 — (51) fold

20°

20 ← grey lenticoid laminated lens

60 — 60° penetrative cleavage at right angles to bedding

60 med grey carbonate laminations < 1mm (that) elongated grains — 176

180 — 70 Ca in fractures + Bedding

1mm sulphide band py sph? 60°

DRILL HOLE LOG

HOLE No. BOA1
PAGE 4 OF 11

COORDINATES
ELEVATION
DIP 60°
AZIMUTH 35
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. SCHMIDT

FOOTAGE | DESCRIPTION | SULPHIDES

180
Ca 10 mm
50°
Rgl CONTINUED
BLACK TO DARK GREEY MASSIVE TO THINLY LAMINATED GRAPHITIC, SILICEOUS LIMY ARGILLITE,
MED. GREY LAMINATIONS MORE COMMON SINCE 176
BEDDING MORE OBVIOUS
40°
190
SAND SEAM NO CORE
191.5
1MM SULPHIDE BAND 40°
40° ξ Ca veins // + hairline Ca filled fractures
1MM SULPHIDES BAND 40°
60° 50°
deformed by lens
~ 199.
50° 1MM also joint ⊥ Bedding
< 1MM by 50°
199
200
< 1MM by 50°
200
50°
— (62)
60° intermittent Ca filled fractures 1-5MM
< 1mm by hand 90°
20° fractures 30° joint 90° strike of Bedding
208
210
— broken ground
— strong penetrative cleavage 30° ± ⊥ bedding
40
Ca 30° (SE JOINT) Bedding @ 40°, G.S. JOINT ⊥ BEDDING 25° = penetrative cleavage
cleavage ⊥ bedding look like stylolites
by hand < 1mm
215
20° ± 10°) attitude reversal
Ca 20° // bedding ⊥ 20°
80° Ca
220
Ca in fracture 10°→90° 10mm
- highly fractured core
Bedding undulates sub // to core axis.
Ca in fractures sub // core axis, also graphitic slickensides which // bedding
230
FRACTURED
Ca
Ca 20mm
240
90°

DRILL HOLE LOG

HOLE No. 80A1
PAGE 5 OF 11

COORDINATES
ELEVATION
DIP -60
AZIMUTH 35°
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. SCHMIDT

FOOTAGE | DESCRIPTION | DIP

240

RaL continued
abundant calcite filled fractures, sub // core axes and at 50° ~242
deformed sulphide bed mainly py

Ca NO CORE, Sand seam
20° FAULT?
Ca in fracture 10° 2-20 MM

250

10°
70°
BROKEN GROUND
30°
60° - graphitic slickensides common

Ca in fracture
- Broken ground
- Breccia in calcite matrix
30-40°

intermittent ca filled fractures 1-10MM WIDTH

260

BROKEN GROUND
5°

← QUARTZ-CALCITE VEIN - c 2 specs of Cpy 2mm diam
60° - calcite in fractures // and ⊥ bedding.

270

50 (82)
- ca // bedding 10 MM also graphitic slickensides // bedding
Ca 60
50
Ca 20° 2-10 MM Ca - penetrative cleavage common, 90° to strike of Ca vein
Ca

280

- penetrative cleavage 30° ± ca veins @ ± 40°
deformed calcite filled fractures common

10° Ca

290

- CRUSHED CORE
- Breccia in calcite matrix

50°

calcite in hairline fractures 10° and 30°

300

Ca - 10° c Qtz.

DRILL HOLE LOG

HOLE No. 80A1
PAGE 6 OF 11

COORDINATES
ELEVATION
DIP 60
AZIMUTH 35
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY G Abbott

FOOTAGE | DESCRIPTION | DIP

300
Ca veins irregular shape - 1-30 mm

20 fracture / cleavage — weak to moderately calcareous

20 fracture / cleavage

310
70 bedding
312 (95)

weak to non calcareous

20
70 minor disc py, 1cm bands
80°
Qz, Ca veins @ 90° to slickensides
80°

320
20
Qz vein
70
ACID TEST UNCORRECTED x 55° 21MM TUBE (99)

330
331 (101)
65°
80°
Ca
weakly calcareous with minor moderately calcareous patches

340
80 slickensides + fracture cl'

85 minor py in 1mm bands

350
70
356 (109)
75
non to weakly calcareous minor 1s bands < 2 cm
>1% py in 2mm bands or as patches < 2 cm

DRILL HOLE LOG

HOLE No. 80A1
PAGE 7 OF 11

COORDINATES
ELEVATION
DIP -60
AZIMUTH 35
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY G Abbott

FOOTAGE		DESCRIPTION	DIP
360	360.5 (110)	grey, non-weakly calcareous, pyritic mudstone thinly laminated but highly disturbed by cleavage	
	20 cleavage		
	10° Calcite veins minor coarse sphalerite		
	80° bedding (111) (112)	black non calcareous shale with minor calcareous patches. Py in lenses 1-5mm across, <1%	
	20° cleavage		
370			
380			
390	(119)	massive grey limestone no pyrite	
	80°		
	10° cleavage cl/bd < 90°	thinly laminated to massive, dark grey non calcareous mudstone, >1% py; grey, thin irregular, discontinuous laminations and oval "blebs" < 3mm across common pyrite in thin laminations, ≤ 2mm wide and concretions up to 2cm across	
400		10a1 Pyritic Siliceous shale	
410			
	75° bedding		
420			

DRILL HOLE LOG

HOLE No. 80A1
PAGE 8 OF 11

COORDINATES
ELEVATION
DIP -60
AZIMUTH 35
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY G ABBOTT

FOOTAGE	DESCRIPTION	DIP
420		
430		
440		
450		
460		
470		
480		

HUGH SALAT NOTES

WISPY STRUCTURE DUE TO BIOTURBATION OR SLUMPING.

411-421
426
457
461-471

SEPARATED BY UNMY HORIZONS.

90° bedding
40° fracture cl

DRILL HOLE LOG

HOLE No. 80 A1
PAGE 9 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY G. ABBOTT

FOOTAGE	DESCRIPTION	DIP
480		
	35 cleavage.	
	calcite brec. chicken-sides @ 35°/CA. pyritic fragments.	
490		
	90 bedding - thin laminations.	
500	35° cleavage.	
510		
	5° over chickensides	
520	(159) massive pyritic (<1%), graphitic black limestone	
	(160) 45° bedding 45° cleavage bd/cl < 90° (160) massive calcareous black ang. lithic sand stone >1% py in 1 mm - 1 cm laminations	
530		
	90° - 80° bedding	

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ/BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. SCHMIDT.

FOOTAGE	DESCRIPTION	DIP
540	dark grey to black weakly to non calcareous pyritic mudstone.	
	85° bedding – pyritic concretions	
	– deformed py band 5mm.	
550	py concretions and small [illegible] concretions along [illegible] 5mm × 2mm	
	– breccia in calcite matrix with [illegible] filled fractures	
560	20°	
	30° (171)	
	30° – deformed limy pyritic bands [illegible] 5mm [illegible]	
570	REDUCED TO BQ [illegible] (174)	
	60 – bedding [illegible] py band,	
	– med to light grey mottled very weakly calcareous mudstone [illegible]	
	30 like chippy mudstone	
	– py concretion	
580	40°	
	– calcite concretions with pyritic core, also larger deformed pyritic band	
	70° med grey & black pyritic laminae [illegible] py., black beds up to 5mm thickness	
	50° – light and med grey mottled weakly limy zone	
	70 – x py nodule	
590	70°	
	80° – 4cm of laminated py @ 80° laminated py up to 5%	
	40°	
600		

DRILL HOLE LOG

HOLE No. 80A1
PAGE 11 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U SCHMIDT

FOOTAGE | DESCRIPTION | DIP

600

10' ± light and dark grey mottled.

80 30° JOINT 90° TO TANGENT OF BEDDING

610

± grey mottled non calcareous mudstone

90°
30°

620

(189)

med and light grey laminated calcareous mudstone
& silt, spotted and laminated, brecciated in part with in.
calcite matrix

(191)

630

640

calcite in breccia matrix

70 — 197

650

40°
(198)

HOLE ENDED

INCLINED ACID TEST @ 40° IN 21 MM TUBE

32° bore dip

acid test footage	corrected angle
325	47
651	33

660

DRILL HOLE LOG

COORDINATES 0+57S - 15+81W
ELEVATION 4100 FT. 1250M
DIP 60°
AZIMUTH 032°
SCALE

CORE SIZE NQ
HOLE STARTED APRIL 23/80
HOLE COMPLETED APRIL 26/80
LOGGED BY U. SCHMIDT

(M.)

FOOTAGE		DESCRIPTION	
		(METRIC) →	
10			
20		[illegible] pebble [illegible]	
		(6) BEDROCK	6.4
		Road River Fm.? Congl? chert pebble congl.?	
		dark grey to black non calcareous, mudstone – pyritic in part, light grey carbonate, pyritic and lithic fragments visible in some sections (≈ 5%–10% fragments) fragments alligned to strong foliation / cleavage low angle to core axis	
30		Blocky ground, highly fractured orange brown rusty weathering on some fractures	
(12)	∠50, 30	∠20° 90° to joint strike ∠50? [illegible] 30° FROM FOLIATION STRIKE	11.6
40		PEBBLY MUDSTONE	
		med → dark grey non calc. mudstone with white dolomite and lithic clasts, pyritic in places usually associated with white carbonate. fragments are deformed & reproduce pseudo-bedding, open space filling observed in fracture at shallow ∠ to core, filled c quartz, dol, euhedral py	
	20		
50			
	∠20	∠20 90° to each other in strike – 1 = pseudo bedding VERTICAL OR SHALLOW N DIP INDICATED ≈ 30°N	17.7
60		Broken ground – c quartz, carbonate vein filling	

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. SCHMIDT

(M)

FOOTAGE	DESCRIPTION	DIP
60	qtz carbonate vein filling — ROPE RIVER FM (Rcm?)	
10°	63.5 — BLACK GRAPHITIC MASSIVE NON-CALCAREOUS MUDSTONE	19.4
	[illegible]	
	PY, [illegible], GYPSUM, [illegible]	
70	[illegible] py bands	
	HIGHLY FRACTURED CORE	
	bedding defined in places by py lamination	
	78	23.8
80	20° ∠20° — MED GREY NON-CALCAREOUS PEBBLY MUDSTONE c̄ LIGHGREY CHERT AND LITHIC CLASTS	
	50	
	2cm qtz vein 20° — fragments range from 2MM → 2cm usually well to sub rounded, elongate, pyritic in part usually, c̄ carbonate, dark grey lithic clasts rare	
	30° ∠20° — clasts make up to 20-40% of rock but are suspended in med grey mudstone matrix	
90	- py content typically < 5%	
	30°	
100	joints ‖ to ⊥ and ∠ @20°	30.5
	-20°	
	30°	
110	60-70 90° ⊥	
	20 [illegible] ∠20 ‖ bedding	
	pyritic fragments [illegible] 10-20%	35.4
	25 ∠ 20	
	[illegible] — mainly limy concretions c̄ py core	
120	10°	

DRILL HOLE LOG

HOLE No. 80A2
PAGE 3 OF 6

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE	DESCRIPTION	DIP (M)
120	[illegible] continued	
	10°	
	20° lim. gypsiferous [illegible]	
130	70°	
	20°	
	20°	
140	highly fractured core.	42.7
150	20	45.7
	60°	
	20	
	60	
	20	
160	60 +20	
	20	
	20	
	60	
	60	
170	[illegible]	
	20 cm clast of massive carbonaceous [illegible] calcareous [illegible]	
	20	
	30° ← good eg. of bedding	
180	40°	

DRILL HOLE LOG

HOLE No. 80A?
PAGE 4 OF 6

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. Schmidt

FOOTAGE	DESCRIPTION	DIP
190	[illegible] grey pebbly mudstone continued, 30-40% light grey, chert and lithic fragments	
	elongated fragments range from 2mm to 2cm	
	20, 20, 40	
	10cm calcite	
200	Broken ground, - lithic and chert fragments increase to normal 30→40%	60.4
20	no visible py.	
	— Ca vein 20, 40-50	
210	~20° Ca vein 5cm.	
	[illegible] mudstone fragment [illegible]	65.2
	graphitic mudstone in deformed chert bands	
220	highly sheared graphitic black mudstone, normal chert and lithic fragments	
	Ca. vein 50°	69.2
230	Ca vein 20 ∥ + & /	
	Ca vein 20°	
240	— black graphitic weakly limy mudstone, possibly fragment.	

HOLE No. 80A2
PAGE 5 OF

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE		DESCRIPTION	DIP
240		[illegible]	
		20 — black graphitic mudstone band broken up.	
		30 mudstone [illegible]	
		60°	
		70 graphitic slickensides ‖ bedding strike	
250		— chert band – 70° cac possible fragment.	
		? braided calcite filled fractures.	
		[illegible]	
		fractured core mainly limy. — fewer fragments than normal	77.1
260			
		– fault gouge, pyrobitumen and carbon	80.8
		intense shearing ‖ fol and bedding and ‖ cac in some cases. – remobilized calcite in fractures common.	
270			
		30	
		20°	83.5
		40	
		70	
280		45	
		30 good eg of bedding.	
		more than normal light grey chert pebble mudstone weakly limy	86.9
		30 ✓ Calcite veins 2–5mm ≈ 10° cac	
290		30 ?	
		> Normal abundance of chert and lithic fragments	
		20	
300			

DRILL HOLE LOG

HOLE No. 80A2
PAGE 6 OF 6

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. Schmidt

FOOTAGE	DESCRIPTION	DIP
300	Black graphitic pebbly mudstone, weakly to moderately foliated especially in fault zones — normal abundance of chert pebbles.	
	ca = fracture.	
	highly broken up core	
310		96
320	30 intense faulting 11 ℄ and +	
	geology	99
330		100.6
	Sand drawn on DIP	
	END OF HOLE	103
340	Acid test 47° corrected angle	
350		
360		

DRILL HOLE LOG

HOLE No. 80A-3
PAGE 1 OF 11

COORDINATES 0+25N - 16+18W
ELEVATION 4125 FT. (1257 M)
DIP 50°
AZIMUTH 032°
SCALE

CORE SIZE NQ
HOLE STARTED APRIL 26/80
HOLE COMPLETED
LOGGED BY U. SCHMIDT

FOOTAGE | DESCRIPTION | DIP

10

15' BEDROCK (CANOL FM.?) 41.6

30 / 11 f

med to dark grey pebbly mudstone, non-calcareous
30-40% light brown grey chert fragments and
minor lithic fragments - also pyritic carbonate
concretions - weakly graphitic

20

30
50

pyrite 1-5%

30

30
40

20 3MM QUARTZ VEINS cutting matrix and fragments,

30 - large flat clast,

50

30

40

30

30

irregular pyritic bands

30

highly fractured core most breaks - have failed along bedding fissile
planes, slickensided surfaces are graphitic.

30

60

DRILL HOLE LOG

HOLE No. 80A3
PAGE 2 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

M

FOOTAGE		DESCRIPTION	
60		py Ca qtz vein 15mm 30° — dark to med grey pebbly mudstone continued, non calcareous, graphitic in sections, chert clasts 2-30mm long and elongate sub rounded,	
	20		
	40	10mm mudstone band	
		3 pyritic laminae in fragment and py carbonate concretions	
	30		
70			
	30°	20mm grey coloured & bedded mudstone band	
		10mm pyritic carbonate qtz vein — greater than normal abundance of black & grey chert fragments	
	30		
80	30	black cherty mudstone band. pyritic graphitic	
		} cave	
90		Sand seam, mostly quartz fragments recovered	27
		60% core recovery highly fractured	
100			
		abundant light grey chert and lithic fragments in mudstone	
	30°		
110		graphitic pebbly mudstone continued slightly > content of black mudstone fragments also an increase in carbon.	
	30°		
	30		
	40		
120			

DRILL HOLE LOG

HOLE No. 80A3
PAGE 3 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

120

dark grey graphitic pebbly mudstone continued
a light grey chert and dark lithic fragments
non calcareous & very weakly calcareous

— mudstone clast displaying ductile sediment deformation.

40

130

10
30°

— 2 laminated mudstone bands at 30° // ?

Qz & qtz vein

pyritic clasts.

140

interlaminated mudstone
← pyritic clasts.

} larger clast fragments mostly pyritic
than non ca.

30°

150

highly broken core - 20% core recovered

mud seam

sand seam no core.

3" of core recovered.

160

6" core

20° / 30

— massive graphitic siltstone band

170

30

4" broken core

180

DRILL HOLE LOG

HOLE No. 3043
PAGE 4 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ/BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE		DESCRIPTION	DIP
180		dark grey & black, pebbly mudstone continued - graphitic, minor lith. clasts,	
30	60	grey mudstone clast with pyritic laminations.	
		- brecciated core lining along fractures.	
	30	- laminated black mudstone & sand 30°	
	30		
190		- pyritic mudstone clast	
	20		
	40	- pyritic laminations, deformed mudstone in pebbly mudstone	
		- large chert and lithic clasts, upto 4cm long axis	
200		- pyritic chert fragment	
30			
		← pyritic chert fragment (core axis)	
210			
		Band seam no CORE	
220		— REDUCED TO BQ —	
	30		
		229.5 FAULT CONTACT	70
230	70	red-to dark grey, banded graphitic mudstone & grey chert bands, banding 70° to core axis. - weakly to non calcareous	
	40°		
	60	237 TRANSITIONAL ABRUPT	
30	30	dark grey pebbly mudstone Typical of upper unit	72.2
240			

DRILL HOLE LOG

HOLE No. BOA3
PAGE 5 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. SCHMIDT

FOOTAGE		DESCRIPTION	DIP
240		reddish mudstone FAULT ~~TRANSITIONAL ARGILLITE~~	
	pyritic bands	241 dark and light grey banded graphitic laminated dusty mudstone.	
	calcite pseudobed // bedding	- ± secondary calcite veins // to and across bedding laminae from 5-10 MM.	
	calcite veins		
250		med grey limestone.	
		± remobilized Ca veins. & graphite	
		dark grey to black banded laminated siliceous mudstone.	
		± abundant calcite pseudobeds and calcite veins x to core.	
260		- graphitic, usually weakly calcareous.	
	qtz carbonate shear zone	- colour bands vary from 2 → 20 MM.	
		- calcite in pseudobeds and fractures 5 to 10% of rock.	
		- blocky core graphitic shears every 4 cm.	
270			
		colour banding as above.	
	calcite fragments	- banded to massive black graphitic siliceous mudstone ± calcite fracture-controlled.	
280			
290			

DRILL HOLE LOG

HOLE NO. 8013
PAGE 6 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE		DESCRIPTION	DIP
300		~~Lining~~ Black massive graphitic siliceous mudstone continued.	
	70		
	50		
	80		
310		highly fractured core	
		- 3" of core fragments recovered.	
		12" "pebbles" recovered	
320		med to dark grey banded siliceous and lime mudstone.	
	50		
	30		
	60	Black lime graphitic mudstone	
330		1 foot core recovered.	
340		med gray limestone.	
		few "pebbles" recovered.	
		grey banded lime mudstone.	
350	10		
		- calcite vein fragments	
	40	Calcite in hairline fracture.	
		- calcite vein fragments	
360			

DRILL HOLE LOG

HOLE No. 80A3
PAGE 7 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

360 Black graphitic dark grey siliceous mudstone continued
— mostly massive, no bedding seen

370 ← calcite vein fragment
30° ~ Ca vein 20°
10 20 faint grey colour banding
30
20
380 60 faint colour banding
— Ca veins.
40° faint colour banding
60 " " "
390 — strongly graphitic gouge.
all pebble size fragments
400
— Ca vein.
— graphitic gouge
410
10 — mixed colour banding
— Ca vein 30 mm
50
6" broken core
420

DRILL HOLE LOG

HOLE No. 80A3
PAGE 8 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE	DESCRIPTION	DIP
420	dark grey to black graphitic siliceous, limy mudstone Continued.	
	- graphitic gouge cleavage ca 60°	
	wavy weak colour banding, 0–10° to core axis.	
430	20° weak laminations.	
	30° thinly laminated dark → med grey laminated, limy mudstone	
	- calcite ~~nodules~~ concretions & pyritic cores.	
440	- faint py // to bedding	
	30 50-60° — Ca vein fragments	
	Ca vein	
450	50° core axis.	
	Ca ~~in~~ matrix	
	abundant Ca filled fractures	
	40 ? or broken core	
	20 curved light grey laminations	
	Ca matrix	
460	graphitic gouge black carbonaceous limy ~~silty~~ mudstone	
	few fragments recovered	
	? broken core.	
40	50	
470	graphite and Ca fragments in fault.	
	20	
	30 curved laminations	
	Ca in fractures 2mm – 20mm 20° core axis also stylolite present.	
480	Ca vein and Ca fragments	

DRILL HOLE LOG

HOLE No. 80A3
PAGE 9 OF 11

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

480 — Ca vein - dark grey to laminated limy mudstone

20

Ca + limonite fractures <1-5mm 10 @ 30° to core.

20
490 — med grey siliceous carbonaceous mudstone

med → dark grey laminated graphitic limy mudstone
- frequently cut by calcite veins

- thin med grey laminations
- wavy laminations
40° fine laminations minor pyrite

500 — wavy med grey laminations
- pyritic limy lamina 0-10° to core axis.
- pyritic limy laminae

Calcite veins 20° core axis.

510

Calcite veins

520 — calcite matrix
- fg laminae 40°

158.5

Ca vein
Ca vein

pyritic laminations increase - V fine grained mica group ?, possibly other fine grained sulphides, weakly limy

60 - grey pyritic laminae for 20 mm

fg laminated

530 — 30 - pyritic laminae

Calcite veins

calcite matrix

540

DRILL HOLE LOG

HOLE No. 80A3
PAGE 10 OF 12

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

540 Ca vein. dark grey to black limy carbonaceous mudstone with minor py laminae continued.
weakly to moderately limy; lighter coloured rock as fine laminae

90° pyritic band
py & calcite vein on concretion.

70 med grey laminations

80

550

60

Ca vein. in Ca vein pyritic concretion ⊥ bedding 5mm x 1 → 3mm.

50 slightly lighter grey tone laminations more visible

60 Ca vein 9cm wide 60° to core.

weakly to moderately limy; lighter coloured rock as fine laminae

560 70 py concretion 10 x 20 mm

pyritic concretions.

pyritic laminae and small concretions
continued but carbon content higher.
→ darker core.

60

70

py concretion

570 Ca vein.
Py.

Ca veins up to 50 mm wide @ 30° core.

gradational change.

175

py in carbonate band.

(*) disrupted streaky laminations

med grey laminated limy, graphitic mudstone, (chippy mudstone texture)

grey sulphide band, could be py & py? or gn? too fine

580 40 disrupted laminae med to light grey with small carb-py concretions

60 internally banded calcite py concretion 20 x 40 mm.

40

40

179

Ca vein or concretion

590 med to light grey limestone interbanded with limy mudstone, bedding less distinct.

40

LS

181

50 med & light grey disrupted laminated limy mudstone "chippy mudstone texture"

30

py concretions

600

20

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE		DESCRIPTION	DIP
600		– "chippy mudstone" continued * moderately limy, lighter grey beds are limier.	
	50		
	30		
	80?		
	50	← difficult to tell if foliation or bedding.	
610	80		
		– pyritic bands	
	80		
	10		
620			
	30	light grey, weakly and irregularly banded limestone.	
		– pyritic concretion.	
	80	med and light grey chippy mudstone weakly limy	
	50	– c dark grey mudstone sections.	
630	⊤ 90?	light grey rounded elongated clasts, luminous concretions? in darker matrix 2mm diameter 5-20 mm long.	
	50 ⊦ 50? –		
640		moderately limy	
		↓	
		≈ limy	
		dark grey to black chippy mudstone equivalent. weakly limy ≈ 50% py & Ca concretions.	
650	60		
		carbonate py concretion.	
		pyritic concretion	
660			

DRILL HOLE LOG

HOLE No. [illegible]
PAGE 12 OF 12

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE BQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE	SA	DESCRIPTION	DIP
660	1	T80°? dark grey [illegible] dipping mudstone continued.	
		end of hole	
		Tested at 230 — 41° magnetic?	
		Tested at [illegible] — 12°	

ITV - ABBEY

DRILL HOLE LOG

HOLE No. 80A-4
PAGE 1 OF 7

COORDINATES 5+84S - 115+86W
ELEVATION 4600 FT (1372M)
DIP 60°
AZIMUTH 032°Az
SCALE

CORE SIZE NQ
HOLE STARTED MAY 6, 80
HOLE COMPLETED
LOGGED BY U. SCHMIDT

FOOTAGE	DESCRIPTION	DIP
0	BEDROCK	
	"FLAGGY" MUDSTONE ORANGE WEATHERING MEMBER	2
	orange brown weathering along fractures.	
10	med - light grey thinly laminated non-calcareous mudstone weakly to	
	50-60° ∥ Z x 20° py concretions	med-dark irregular wispy beds and laminae in light grey matrix
20	60	
	70-80° 10-20° - steep joint is — py concretions along joint	
20		
	- circular pyritic concretions.	
	70	
30	20 60	
	20	
	— pyritic concretions 60 and 40° to core	
	pyritic dolomite bed	
	70	
30	30	
	— orange brown weathering fractures.	
	dark grey variation of above	
	70	
40		
	med grey thinly laminated mudstone	
20	50	
	contains Carbon — med grey thinly laminated limestone. minor py concretions	
	- Ca fragments and graphitic zones	
50	50	
	dark grey to black thinly laminated non-calcareous mudstone - minor pyritic laminae.	
	med grey "flippy mudstone" with dark grey wispy bituminated bands.	
	100 graphite and white vein.	
60		

DRILL HOLE LOG

HOLE No. BOA4
PAGE 2 OF 7

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY U. SCHMIDT

FOOTAGE | DESCRIPTION | DIP

med to light grey "floggy" mudstone" continued
with dark grey bioturbated bands
non to weakly calcareous

60
80
30 /
30 — Ca vein ± pyrobitumen & minor graphite
30 — Ca vein 20°
30
/50 — med grey wispy beds in dark matrix
70 30°

— pyritic calcite concretions
pyritic calcite concretions up to 5% of the rock

30 90° to strike of bedding
/50 — dark band
— Pyritic calcite concretions
80
— pyritic calcite concretions 5-20 mm diameter
/50 — dark grey matrix over 40 mm.
30° 90° to strike of bedding
90
— 20-50 mm ~~ca~~ pyritic calcite concretion
/50 — 20-30 mm pyritic concretion.
pyritic concretions
light grey chippy mudstone texture weakening
50
/60
weakly to moderately calcareous except Ca concretions
— "feathery concretionary Calcite bed
100 — Py Ca concretions.
quartz carbonate vein.
light grey silty limestone ± minor pyrobitumen & graphite
— 40° graphitic
110
/60 — black thinly laminated calcareous mudstone
feathery carbonate Py concretions.
TRANSITIONAL OVER 6" Ca concretion
/50
Howards Pass Fm "Upper Siliceous Mudstone Member" 10a S
Middle Unit?
black, graphitic thinly laminated siliceous pyritic, weakly to moderately silty mudstone
120

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE		DESCRIPTION	DIP
120	py laminae & concretions 1-2 mm; Ca veins; ∠60; 50°, 90° to ∠ STRIKE	Howards Pass Fm – continued (see over for description) "upper siliceous mudstone member" 10aS middle unit?	
	∠60	Weak graphitic thinly laminated siliceous pyritic weakly to moderately limy mudstone ↓	
130	∠60	Black and med grey banded cherty mudstone c̄ grey calcareous bands.	
MISSING	∠70	limy laminated cherty mudstone c̄ py. laminae.	
py	30-40% chert bands	dark grey to black thinly laminated carbonaceous siliceous mudstone c̄ ~~[struck]~~ med grey chert bands, discontinuous 2-10 MM THICKNESS	
140	∠60 – pyritic laminae common.	intermittent calcite-pyritic band. 5-30 MM THICKNESS	
	∠40 – folding	– also dark grey coarsly crystalline fetid calc. concretions	
	∃ limestone band!		
150	∠60		
	∠60 – py band 5mm wide		
160	– fetid calcite concretion, folding associated c̄ concretion. also chert and py.		
limy bands	∠ 70-80°	limy pyritic band 30 mm wide	
	∠80 – py. ∠ ≈ 10-20° to core 90° to strike of bedding.		
170	∠80		
50	← fold! – pyritic at upper contact!	intermittent limy bands ↓	
50	– med grey cal fetid carbonate concretion		
	∠50 – banded limestone for 6" ∠60°		
180	∠50 – ca vein.		

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE NQ
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

180 Upper Siliceous Mudstone Member
graphitic and siliceous mudstone c chert and limy bands.

∠60 — thinly laminated med grey limestone —

— grey crystalline concretion.

∠80 UP Sil mudstone continued c chert and limy bands.

30 ← JOINT 90° TO STRIKE OF BEDDING often deformed

190 } thinly laminated carbonaceous mudstone ~~graphitic~~ carbonaceous.

∠60 — minor pyritic laminae — dark grey c med grey chert bands and intermittent limy bands often deformed, bands are 2-10 mm thick. intermittent calcite filled fracture, pyritic calcite concretion and coarsely crystalline Ls concretions 1-2' diam. — also thinly laminated py bands.

} thinly laminated graphitic calcareous mudstone

— weakly to moderately limy throughout.

200 — ? Facies 4 of ACTIVE MEMBER (thin bedded calcareous mudstone facies) in appearance.

— Py calc. concretion. trace pyrite, possible other sulphides

∠55

— py and calcite concretion

∠50

210 ∠70

Ca vein 30 mm also smaller Ca vein ∥ and crosscutting

∠20

40

∠70 ← Py Ca concretion

220 ∠80

← grey bands rimmed by py

} — cave with py carbonate fragment

230

M. grey crystalline ~~cnt~~ limestone concretion pyritic at upper and lower contact
← xl

∠60

Ca concretion? or vein

∠ 70-80°.

∠40

240 } ~~m~~ med grey thinly laminated LS ∠40

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE		DESCRIPTION	DIP
240		Ca vein; med to light grey silts & Ls concretions — "Upper siliceous mudstone" continued: carbonaceous dark to med grey laminated colour banded siliceous med weak limy to mudstones	
		Calcite concretion — med to light grey laminated and colour banded cherty mudstone, lighter colour than above, more siliceous, less carbon weakly to non-calcareous, hairline calcite filled fractures common.	
	∠60		
249.40	∠50	joint 90 to ⊥	
250			
	∠50	stylolites ∥ and ⊥ to ⊥ — calcite filled fractures common ∥ core axis	
260			
	∠60		
	∠50		
		black to light grey massive thinly laminated siliceous mudstone grading to light grey limestone and back to mudstone	
270	∠80	} grey Ls	
		Ca vein	
	∠60	Ca vein — dark to med grey thinly laminated banded siliceous cherty mudstone continued carbonaceous, weakly to non calcareous except for calcareous bands and secondary Ca veins — secondary calcite in fractures and ∥ bedding common 1–10 MM wide	
280	∠60	— Py calcite concretion	
		Ca qtz vein 10° 15 MM wide	
		deformed bedding — plastic slump deformation! ∥ core axis	
290		20° 90° to ⊥	
	∠30		
	∠60		
300	∠70	— GRAPTOLITE HORIZON —	

DRILL HOLE LOG

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

300

Upper Siliceous Mudstone Member continued
med & light grey banded, thinly laminated siliceous carbonaceous and weakly limey siliceous mudstone, with chert and carbonaceous rich bands.
2-10 mm bands most common, cut by boundary calcite veins and "pseudo beds"

40-50 wavy bands

graphitic fault.

30 — 0-10°

310

wavy beddings — more siliceous towards unconformity

60

50 — 60°

30°

40

320

carbonate content increasing.

light grey thinly laminated limestone

40

330

40 JOINT 90° TO STRIKE OF F

med-light grey banded — siliceous mudstone continued
minor pyritic bands

pyritic concretion

340

grades into limestone

pyritic — med to light grey thinly laminated siliceous limestone
massive

pyritic

grades into siliceous mudstone

pyCa concr.

20° 90° to F

Dark grey to black carbonaceous siliceous, non calcareous thinly laminated mudstone & pyritic laminae and grey silty limestone concretions minor calcite veins and pseudobeds.
Py up to 5%

350

pyCa concretion

90°

360

DRILL HOLE LOG

HOLE No. 80A4
PAGE 7 OF 7

COORDINATES
ELEVATION
DIP
AZIMUTH
SCALE

CORE SIZE
HOLE STARTED
HOLE COMPLETED
LOGGED BY

FOOTAGE | DESCRIPTION | DIP

360 — laminated LS grey [illegible] Py. dark grey to black carbonaceous siliceous thinly laminated mudstone continued.

} med grey thinly laminated limestone.

— Ca vein.

370 } dark grey to black thinly laminated graphitic limestone.

50

} - dark grey pyritic ~~grey~~ carbonaceous LS
- graphitic from 6.

380 highly carbonaceous
black thinly laminated carbonaceous pyritic ~~[illegible]~~ mudstone.
platy cleavage quite common.
non calcareous except for secondary calcite veins

58

390

1/8

END OF HOLE

Acid test

400

410

420

ITSI J.V. – ABBEY CLAIMS: LOG DDH 80-A4

COORD. 5+84S, 115+86W DIP -60° AZIM. 032° ELEV. 1372 M SIZE NQ STARTED May 6/80 COMPLETED _____ LOGGED BY R.C. Carne

VISUAL LOG	FOOTAGE Intersection	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY % INTERBEDS	CORE ANGLE Bedding W	CORE ANGLE Bedding E	CORE ANGLE Structure W	CORE ANGLE Structure E	PYRITE Lam. % Thickness	PYRITE Diss. % Size	BARITE Bed. % Thickness	BARITE Bleb. % Size	CO_3^- Type % Size	OTHER % Description	ANALYSES % ppm Pb	ANALYSES % ppm Zn	ANALYSES % ppm Cu	ANALYSES oz. ppm Ag	ANALYSES % ppm Ba
	0.0		CASING																
	7.0		BRN-GREY NON-CALC. SILTY MDSN, MASSIVE BIOTURBATED	FLASER BEDS 10 <1CM, DK GREY NON-CALC SILTY MDSN	55 / 75		15		CLOTS Tr <1CM COARSE SCATTERED	DISS Tr SCATTERED COARSE <2MM			VEIN Tr <1MM						
	20.0		SOS AS ABOVE	SOS 20 BLK SHALE AS ABOVE 35.5-40.5	70 / 60 / 70				CLOT Tr "	DISS Tr "			VEIN Tr "						
	40.0		SOS AS ABOVE BIOTURBATION INC. D/S	FLASER BDD BLK SHALE <2CM THICK LAM SHAL 51.2-52.0, LAM. DK GY NRRITC LISN 46.3-51.2 30	50 / 50 / 50		30		LAM 05 IN BLK SHAL UNIT	CLOT Tr BED. IN LISN & MDSN			VEIN Tr "						
	60.0		SOS AS ABOVE STRONG BIOTURBATION	FLASER BDD 30 BLK SHAL <1.5 CM, SCATTERED 3-4CM BEDS c/c VARIES	50 / 50					CLOT Tr <1CM IN MDSN			VEIN Tr <1CM						
	80.0		SOS BRN-GREY NON-CALC, BIOTURB. SILTY MDSN, MINOR CALC. INTERVALS	FLASER BDD 35 BLK SHAL, <1CM, SCATTERED <1CM INTERVALS	50 / 50 / 60					CLOT Tr "			VEIN Tr "						
	100.0		SOS MINOR CALC INTERVALS CSE GND LISN 105.0-106.8	SOS BIOTURB. DEC D/S, MINOR CALC INTERVALS 15	60				LAM Tr IN BLK SHAL	CLOT Tr "			VEIN Tr "						
	115.4		ABRUPT CONTACT VARIABLY LOW-V, CALC. V.SIL. MED GRNED BLK SHALE, V.CARB.	CALC DK GREY MDSN <8CM @ TOP, DEC TO <0.5 CM DOWN SECTION 10	50 / 60				LAM 03 IN BLK SHAL	DISS Tr IN BLK SHAL			VEIN Tr "						
	130.0		SOS MINOR REXT LISN WHERE CALC CUT EXTREME	SOS DEC D/S, <0.4CM <0.4 CM BLK CHRT BEDS, SCATTERED 05	60 / 70				LAM Tr DISCONT.	CLOT Tr IN BLK SHAL <1CM			VEIN Tr "						
	150.0		SOS CALC CUT IN RAPIDLY, MINOR LISN NOD @ BASE	SCATTERED <0.5 CM BLK SHAL BEDS. 05	60 / 75				LAM Tr "	CLOT Tr <0.5CM SCATTERED			VEIN Tr "						
	164.0		SOS, NOW MOD.-V. CALC. V. MINOR LISN NOD	SOS AS ABOVE SCATTERED, <30CM BLK CRS AT LISN NOD 05	80 / 50								VEIN Tr "						
	180.0																		

"RUSTY MDSN FM."

UPPER SIL. MDSN (HOWARDS PASS FM.)

ITSI J.V. – ABBEY CLAIMS: LOG DDH 80-A4

COORD. _____ DIP _____ AZIM. _____ ELEV. _____ SIZE _____ STARTED _____ COMPLETED _____ LOGGED BY R.C. Couse

VISUAL LOG	FOOTAGE Inter-section	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY % INTERBEDS	CORE ANGLE Bedding W / E	CORE ANGLE Structure W / E	PYRITE Lam. % Thickness	PYRITE Diss. % Size	BARITE Bed. % Thickness	BARITE Bleb. % Size	CO_3 Type % Size	OTHER % Description	ANALYSES % ppm Pb	% ppm Zn	% ppm Cu	oz. ppm Ag	% ppm Ba
			MOD.- V.SIL. BLK SHAL, CALC. CNT VARIABLE (LOW-V. CALC), LISN BED 184.1-186.0	CHERTY NON-CALC BLK SHAL, RHYTHMIC, BOUDIN'D BEDS (SOFT SED) < 0.8CM. 10	60 / 80		LAM Tr; DISCONT. THIN	DISS Tr; IN LISN NOD.			VEIN Tr; <1CM						
	198.5		SOS, CALC CNT DEC. RAPIDLY NOW LOW-MOD CALC, V.SIL.	SOS. ← 10; GREY LISN BED GRADED & SLUMPED @ BASE 198.5-199.8	55 / 50		LAM 05; THIN	DISS Tr; IN BLK SHALE			VEIN Tr; "						
	220.0		SOS, CALC CNT. VARIABLE	SOS, CSE GRAINED RECT LISN BEDS(?) 20-50 CM 20	80 / 70 / 60		LAM 05; THIN	DISS Tr; AT CNT W LISN IN LISN			VEIN Tr; "						
	246.0		RHYTHMIC BDG, BLK SHALE & GREY MDSN, ALL V.SIL TO CHERTY	"BOUDINED" CHERTY MDSN BEDS (SOFT SED) 20	60 / 50 / 50		LAM Tr; DISCONT. IN SHAL	DISS Tr; IN MDSN			VEIN 05; "						
	266.0		V. CALC. BLK SHAL GRDG D/S TO GREY MICRITIC LISN & THEN TO SHAL	SHAL MOD.	80		LAM 05; DIFFUSE IN SHAL	DISS Tr; IN SHAL			VEIN Tr; <1MM						
	271.0		RHYTHIC BDG VARIABLY LOW-MOD. CALC BLK SHAL 1-3CM	"BOUDINED" CHERTY BLK MDSN 0.5-1.0CM MINOR THIN LISN 15	60		LAM Tr; DISCONT IN SHAL	DISS Tr; IN SHAL			VEIN Tr; <1CM	SOFT. SED FOLDING 280.0-284.0 // CORE AXIS					
	290.0		SOS AS ABOVE	SOS AS ABOVE NOW 1.0CM-3CM 20	10	30 SHEAR	LAM Tr; "	DISS Tr; "			VEIN Tr; <1CM	MINOR GRAPHITE ON SHEAR ?					
(F)	300.0		SOS AS ABOVE	(F) SOS GRAPTOLITES (MONOGRAPTUS?) 15	50 / 60		LAM Tr; "	DISS Tr; "			VEIN Tr; <1CM	NOW GOOD PARTING ON BDG SFC.					
	324.0		FINELY LAM GREY CALC MDSN TO MICRITIC LISN	NON. BIOTURBATED	40 / 40												
	332.5		GRADATIONAL CNT VERY SIL TO CHERTY BLK SHAL 1.0CM-4.0CM	<1.5CM RHYTHMIC REST LISN OR CALC MDSN BEDS 20	40 / 50		LAM Tr; DISCONT IN SHAL				VEIN Tr; <0.5 CM.	MASSIVE GREY LISN 340.5-345.5 BIOTURB. @ TOP					
	345.5		V. CALC. BLK SHAL, THIN BDD, VAR. LOW-V. SIL, V. CARB.	SCATTERED LISN BEDS 1CM TO 10CM 05	60 / 90		LAM 05; PINSTRIPE DISCONT.				VEIN Tr; <0.5 CM	V. GOOD CLV. DEV					
	360.0		SOS NOW MOD. V. CALC @ TOP DEC. D/S TO LOW CALC	SOS DK GREY LISN 363.8-366.0 SCATTERED < 10CM LISN	80 / 55		LAM 03; "										
	380.0																

ITSI J.V. - ABBEY CLAIMS: LOG DDH 80-A4

COORD. ______ DIP ______ AZIM. ______ ELEV. ______ SIZE ______ STARTED ______ COMPLETED ______ LOGGED BY R.C. Carne

VISUAL LOG	FOOTAGE Inter-section	FOOTAGE True Depth	PRIMARY LITHOLOGY	SECONDARY INTERBEDS	%	CORE ANGLE Bedding W E	CORE ANGLE Structure W E	PYRITE Lam. / Thickness	%	PYRITE Diss. / Size	%	BARITE Bed. / Thickness	%	BARITE Bleb. / Size	%	CO_3^- Type / Size	%	OTHER Description	%	Pb %	Pb ppm	Zn %	Zn ppm	Cu %	Cu ppm	Ag oz.	Ag ppm	Ba %	Ba ppm
			LOW-MOD CALC (VARIABLE) NON-SIL, V. CARB BLK SHAL			50°		LAM / SCATTERED THIN	Tr	DISS / COARSE (<1MM)	.02					VEIN / <1CM	Tr												
	395.0		END																										

Wednesday 25 of June -

DIAND Core shed - White Horse

Iteri Hole 80-6

7' - 90' - light grey whispy laminy mudstone - with blebs of nodular pyrite and some thin horizons of limy pyrite
fracturing of core is 45°/c.a. = schistosity
bedding seem variable of whisps are indicative.
Many of the whisps have a dish structure (water escaping during compaction), other are laminae type
CO_3Ca content varies from very little to little -- dolomite?
Some dark shale interbeds

At 35' - very finely laminated w/ secondary kink folds and discolored darker colored - laminae at 60-70°/c.a.
Much more Carbonated - CO_3Ca → limy laminated mudst

At 46' - back to non-limy whispy mudstone. (flaser bedding?)
- lot of blebs of pyrite
- Calcite veining locally with hematite
- some horizons: darker and "whisps" passed to light nodules of .1 to .5 cm -- flattened (intraformational?) - they are more numerous toward bottom + and marked = bedding at 60°/c.a.

80' - 119 - Micrite soft whisp but less pronounced - many although separated by crystalline limy nodules up to 5 cm ϕ, well rounded (concretions).
Some shaly horizons, yet darker grey, often laminated & limy

119 - Black calcareous shale, pyritic, very thinly laminated
laminae ∂ 70°/c.a
Near 136': thicker lighter colored laminae show intensely kink fold due to later schistosity
complementary 85°-80°/c.a

becoming less thinly laminated -
Very carbonaceous
the slightly colored laminae are more silty and often non calcareous and harder → cherty -
thicker laminae are often lensoy due to secondary schistosity as mentioned above
Pyrite is in laminae, in blebs, nodules + blebs associated to calcite
Some calcite veining, sometimes with bitumen globules

Down from 150 - the cherty laminae are wider apart but thicker, up to .5 cm
there appears some microsparitic nodules of limestone often rimmed with pyrite - the boundary of these nodules seem usually transitional → concretions.

At 172' - a 20 cm bed of black sparitic limestone

196 - 196.5 → At 196' - very siliceous, non-calcareous - black → chert carbonaceous
locally some calcareous thin laminae.
70°/c.a.

196.5 - 200.5' - light grey micritic ls.
@ 200' - silty with cross-bedding.

200.5' - 223 - Very siliceous, shale to cherty - very carbonaceous, black
A few lighter bed, limy - but rare - these beds are silty although most are non-calcareous - except when extremely fine laminated (quite a bit of calcite)
undulated ↗ in grain-size → to f.g. sandy

223 - 241 - Intercalation of cherty layered, v. siliceous mudstone often laminated with limy, silty a not, laminae
- with thinly laminated cherty - limy layers
- and with 10-20 cm micritic limestone
less carbonaceous -
pyrite in thin laminae + disposed, but v. f.

241 - 244 - grey, micritic limestone

314' - 324' - Black chert, nibbonned. non carbonated
non-carbonaceous

bit of calcite hairline fractures
at 271', 3' of v.f. laminated limy section
Around 280' a limy nodules, often concentrically zoned
281 - 282.5' = vertical (0°/c.a.) lamination, + bit
of Q + minn calcite veining (veins upto 1cm thick)
Many silty laminae wK sand upto 125-177μ.
- usually lighter in colr

306' - become carbonaceous, locally very rich *
- some limy laminae in zones.

311' - a few limy concretion-or nodules. about 301'.
same with non-limy, silty = due to secondary folding
- squeezed out layers into lenticular concretion (knotting)
+ more and more carbonaceous

324 - 333' - dk grey very limy shale, laminated (>40°/c.a.)
333' - 342' - dk grey - v. siliceous shale with local interlaminae
more limy - Carbonaceous v. silty
342 - END - minute limestone. which turns into at 347' into
a black, v. siliceous*, very limy shale
locally silty, with pin-stripped pyrite
(pyrite in all throughout the core) -
v. carbonaceous -
20-15°/c.a

* v. hard is
fact that where

silty in some horizons

becomes much less limy for 385' down

395' END of HOLE 80-A-4

Hole 80A-3.

- 241' quartz pebble conglomeratic silty mudstone to conglomerate
no grading, no structure
angular to sub-rounded fragments - 1mm to 2cm ϕ

241' - 575' - interbedded light grey, dk grey bed of silty shale
v. more limy interbed.
carbonaceous.

becoming more and more limy, but less interbedded
v. carbonaceous.

575 - 645' Whispy (flassy clayey parting) shaly limestone
to limy mudstone
locally nodular to gravelly - (intraformational)

645' - 665' dk gr. locally limy, to non-limy, shale
some horizons are whispy (a flassy?)

665' END OF HOLE

around 380' - Broken up core as shale - which is
mean transition between non-limy to limy
black shale.
Could be the base of Cond (Imperial)
on top of eroded Road River.
The v. carbonaceous shale being the
active zone and a limestone a
transition zone of Magnafi.

Hole 80-A-2 - drilled to top of 3 - → pebble conglom. to
mudstone

Note: base of H.80A-2. = the whispy to whispy limy mudstone looks very
much like the Chippy mudstone but the ϕ consist
in more lime, (much more ↗ to) and no structure

Hole 80A-1

23 - 243 dk grey, massive, no structure, limy shale
some laminae in place. 80°/c.a.
· carbonaceous, but very carbonaceous around 128-138
where core is highly broken

243-245' - 2' gouge zone.

245' - 361 . same as above but less limy in many intervals
However from 290' approx. down sharp / in $CaCO_3$
and carbonaceous.
$CaCO_3$ content decrease again around 350 to nil
then at:

361' - 366' .. green bioturbated mudstone with worm channels,
well visible and disturbed structures.

366' 371 - . no & little limy mudstone..

371 - 372' - Gouge. fault zone.

372' - 400 - med. grey, non-limy mudstone. - all the mudstone
are somewhat laminated. (60-70°/c.a.)
with more limy to ls layers (15 to 1cm thick)
that grade into a micritic l. grey limestone
this sequence repeat 2x more

400' - non calcar. dk grey, somewhat laminated mudstone
very rare limy horizons.
Some horizon grades into gravelly intraformational
layer. usually on top of a whispy mudstone bed
at 436' and 457' also 466'-471' etc.
.. — again @ 461-471'
in between a gravelly mudstone is
more common.
Some limy horizons again = they
seem in general to be just below
a "whispy" mudstone horizon. They
are generally darker, seem to be very
finely laminated & correspond to a time of slow
deposition and seem somewhat truncated by above
whispy mudstone which base often contain pyritic

nodule -> we wondered if we wouldn't be a
zone of receiving distant turbidite (D)? with
on top a current effect -> gravelly intraformational top?

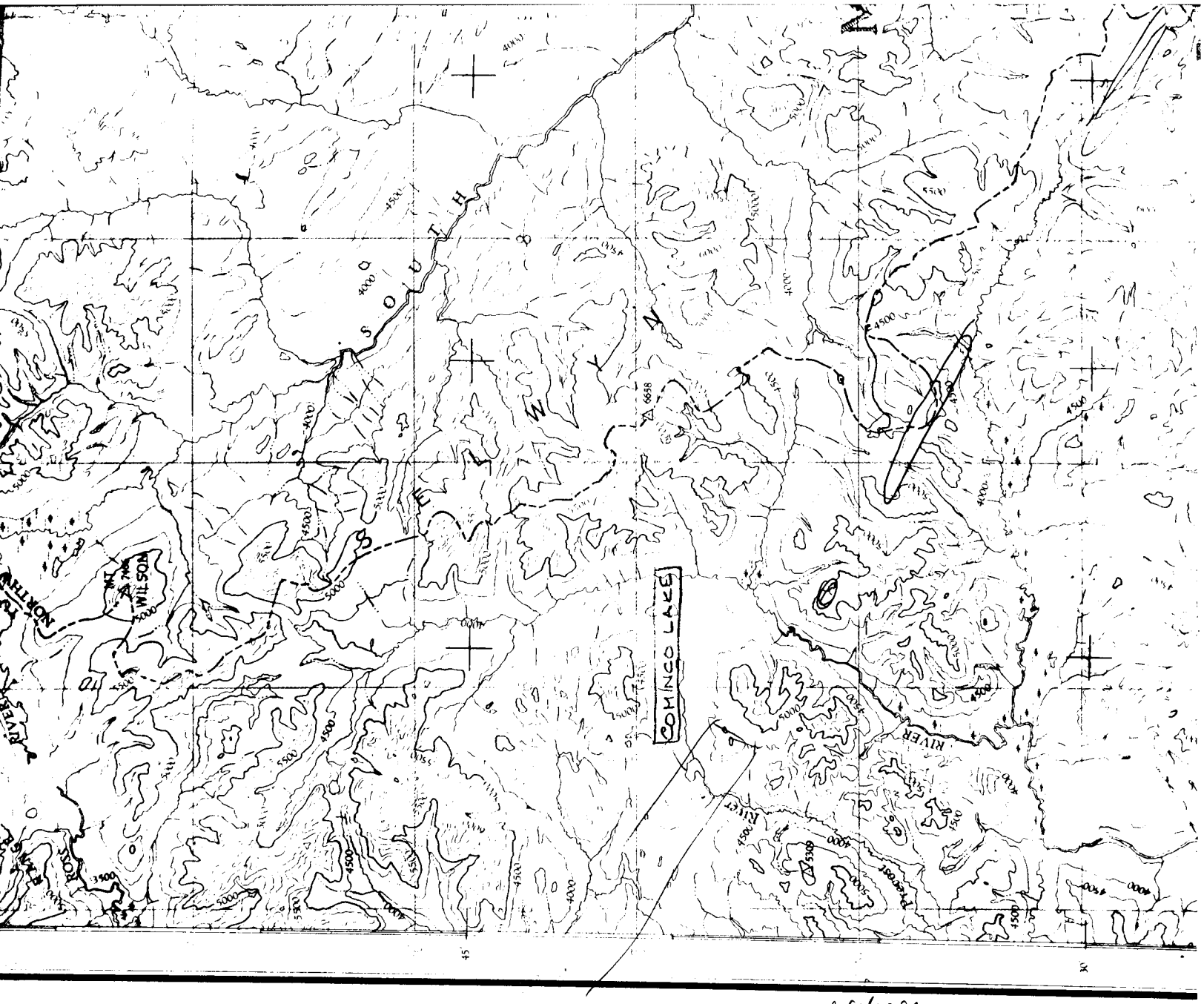
506.5' = gouge
526 - 2' of limy shale.
more lamination are apparent
in fact from 506.5' - 507 = we're back into intercalation
of v. dk grey shale, somewhat carbonaceous (variable)
with same but limy & very thin limy laminae.
more & more finely laminated -> a "pin-stripped"
shale, often little
limy.
but at 573 and 574 = again whispy mudstone, greenish
interrupt the pin-strip shale
then on, the pin-strip shale are more constantly limy
(that is from 540' down) specially passed 580'.
& the whispy mudstone again at 587'
Many fine lamination well visible at 593 and 599 - mainly
silty & pyritic. - although the zone is more silty
with generally sedimentary pyrite
(clastic
@ 592': some cherty boudinaged laminae (.5cm thick)

From 603 to 609 = id°, although less "pin-stripped" and a
few interludes (3 to 5cm) of whispy
mudstone.
and a few layers (1-2cm) of massive pyrite
schistosity still at 80-85°/c.a.

632 and 635': 15 to 20cm of non limy whispy mudstone
greenish - dk grey.
otherwise: limy shale with around 627': laminated
micritic ls.
(note. @ 621': non-limy, but pin-stripped mudst. with laminae,
regular, .3 to .5cm thick of black cherty looking nature)
640 = well laminated shaly limest. - limy mudstone.
645 = whispy mudstone.

651 - END OF HOLE

Carbonaceous & throughout
lot of pyrite in its disseminated as well in



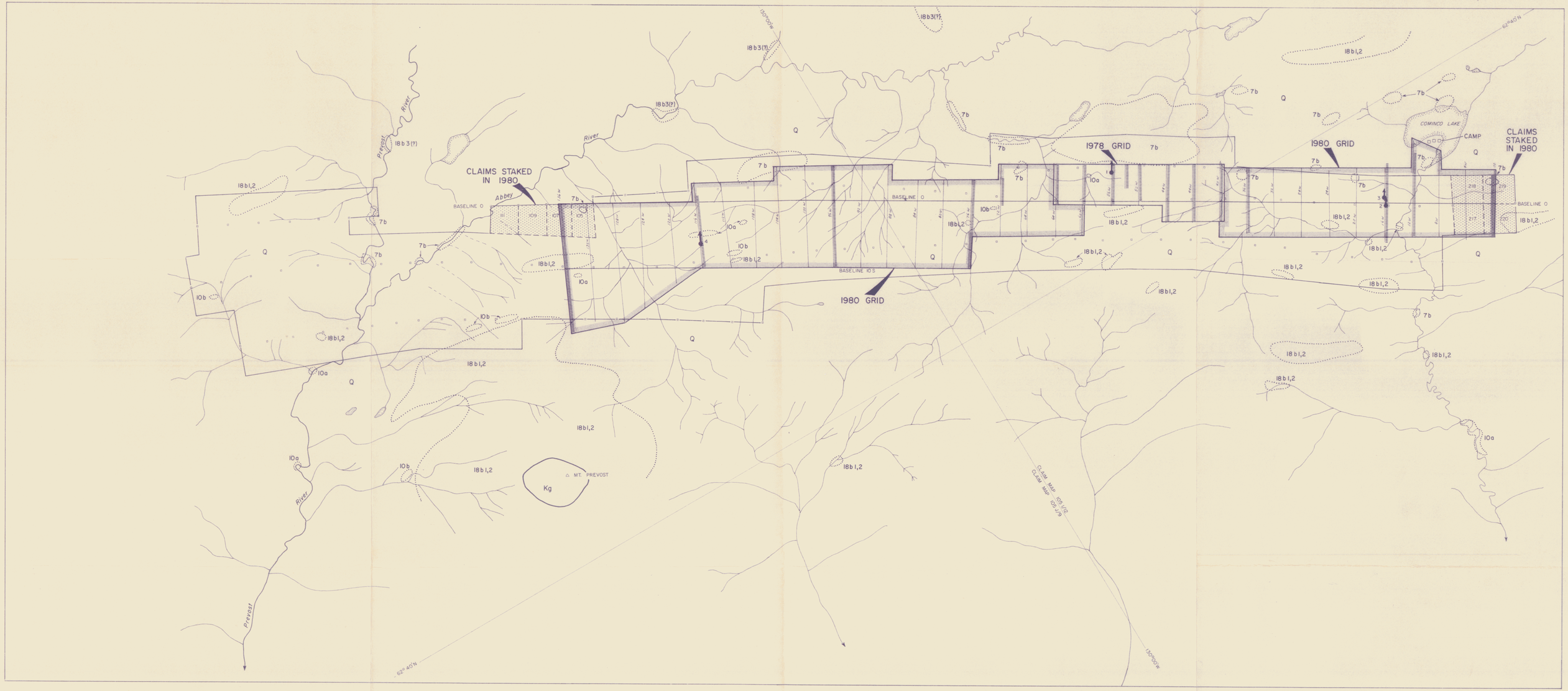
HAFr Homogeneous carbonaceous mudstone, and siltstone

Axeni member - interbedded carbonaceous mudstone, limestone and chert.

- discontinuously in linear belt trending 300° parallel to Flat Lake and Axi Mountain

- lateral thickening into small isolated sub-basins

elongate / to ellipsoidal



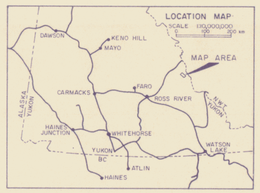


TABLE OF FORMATIONS

RECENT

Q — unconsolidated alluvial and fluvial till

CRETACEOUS

Kg — granitic stocks and quartz-feldspar porphyry dikes, mostly quartz monzonite in composition

UPPER DEVONIAN OR MISSISSIPPIAN

"BLACK CLASTIC GROUP"

18b3 — resistant, brown weathering chert grit, sandstone, shale

18b1,2 — light bluish-grey weathering, black sooty chert, cherty argillite, light bluish-grey and locally rusty-brown weathering, dark grey and black silty shale; chert grit; chert pebble conglomerate; dark grey bedded barite near top of unit, may locally include younger clastic rocks of the Imperial Formation

ORDOVICIAN TO MIDDLE DEVONIAN

"ROAD RIVER FORMATION"

FLAGGY MUDSTONE FORMATION

10b — resistant, orange to tan weathering, chippy mudstone, variably dolomitic and pyritic silty mudstone, irregular flaser bedding characteristic

HOWARD PASS FORMATION

10a — dark grey, brown, blue or black weathering recessive carbonaceous black shale, mudstone, cherty argillite, coarse grained black limestone, a central siliceous zone is host to the Howard Pass zinc-lead deposits

UPPER CAMBRIAN TO ORDOVICIAN

RABBITKETTLE FORMATION

7b — wavy banded silty limestone, resistant, light grey, yellowish or brownish-grey weathering, thinly and irregularly bedded

LEGEND

- 1980 Diamond Drill Hole
- EM 16 Survey line
- MAX MIN II Survey line
- contact assumed
- interpreted fault
- claim post
- area containing small scattered outcrops or an abundance of residual rock fragments in soil

Drainage map prepared manually from uncorrected photo mosaic

FIGURE 1

ARCHER, CATHRO & ASSOCIATES LTD

COMPILATION MAP

ABBEY CLAIMS

ITSI JOINT VENTURE

HOWARD PASS DISTRICT, Y.T.

SCALE 1:25,000

500 0 500 1000 1500 2000 metres

To accompany a report dated June, 1980