HOLE No. BY 2

PASMINCO EXPLORATION
DIAMOND DRILL CORE RECORD

LOCATION	WESTERN TASMANIA
PROJECT	MT BLACK EL 12/88
PROSPECT	BASTYAN DAM
DESIGNED BY	J.G. PURVIS
LOGGED BY	J.G. PURVIS
RELOGGED	
COMMENCED	16·3·92
COMPLETED	15·4·92
DRILLED BY	EAST COAST DRILLING
DRILL RIG	LONGYEAR 38

OBJECTIVE

TO TEST FOR THE IN-SITU SOURCE OF MASSIVE BASEMETAL SULPHIDE RAFTS AND CLASTS THAT OCCUR IN THE HANGINGWALL EPICLASTICS AT BASTYAN. THIS SOURCE POSTULATED TO BE A MASSIVE SULPHIDE BEARING UNIT, LYING BETWEEN THE BASE OF THE HANGINGWALL EPICLASTICS AND THE ROSEBERY FAULT, IMMEDIATELY NORTH OF THE DAM.

RESULT

NO MINERALIZATION OF CONSEQUENCE INTERSECTED.
HANGINGWALL EPICLASTICS CONTINUED RIGHT TO THE ROSEBERY FAULT.
ROSEBERY FAULT ENCOUNTERED MUCH HIGHER IN THE HOLE THAN EXPECTED, INDICATING OVERALL LOW-ANGLE EASTERLY DIP OF THIS STRUCTURE, DESPITE ORIENTATED CORE MEASUREMENTS SHOWING FAULT HAS STEEP EASTERLY DIP WHERE INTERSECTED.

LOCATION/SURVEY DATA (AMG)

Grid	AMG		RL Collar m	167·6
Northing m	5 378 678·5		Bearing Collar	240°
Easting m	378 024·0		Dip Collar	−60°
DH Survey Type	SINGLE SHOT EASTMAN CAMERA		Length Hole m	412·5

Depth m	Bearing	Dip	Depth m	Bearing	Dip
30	244°15′	−58°15′			
60	245°45′	−55°			
90	247°	−54°			
120	247°30′	−53°15′			
150	249°	−51°15′			
180	250°45′	−50°15′			
210	251°	−47°30′			
240	251°30′	−45°			
270	252°	−42°30′			
300	251°30′	−41°			
330	251°45′	−37°30′			
360	252°	−36°30′			
390	253°30′	−34°15′			
412	255°30′	−32°			

SIGNIFICANT INTERSECTIONS

From m	To m	Interval m	Cu	Pb	Zn	Ag	Au	Comments
311·35	312·4	1·05	437	1228	1558	2	<0·008	BEST INTERSECTION: SULPHIDE
								VEINS IN ZONE OF CHLORITISATION
								WITHIN HW EPICLASTICS.

SIGNIFICANT CORE LOSS

From m	To m	% Lost
NO SIGNIFICANT LOSS		

POOR GROUND CONDITION ZONES

From m	To m	Condition
0	22·2	MODERATELY FRACTURED + BROKEN. 25% WATER LOSS @ 19-22·2m.
	75·6	100% WATER LOSS IN FRACTURE
365·65	366·6	ROSEBERY FAULT. PUG + CRUSHED ROCK.

HOLE SIZE

Size	Depth m
HW	1
HQ	3
NQ	412·5

HOLE CONDITIONS AFTER COMPLETION

Collar	CEMENTED STEEL CASING WITH SCREW-ON STEEL CAP.
Steel Casing	HQ 0−3m.
PVC Casing	40mm, UNSLOTTED, TO BASE
Ground Water	WATER LEVEL STEADY AT 11·5m DOWNHOLE.
Wedge	- / CORE PHOTOGRAPHED AND STORED AT TULLAH COMPOUND.
Drill Pad	REHABILITATED AND REPLANTED

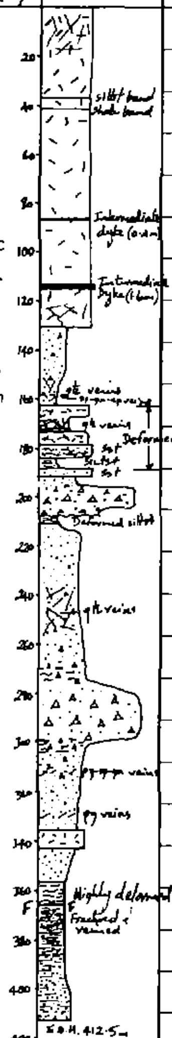
PASMINCO EXPLORATION
SUMMARY DIAMOND DRILL CORE LOG

HOLE No. BY2

PROJECT: MT BLACK EL 12/88

Graphic Scale 1: 2,000

From m	Interval m	Code	Description	Depth (m)	Graphic
			<u>0 - 178.6m: MT BLACK VOLCANICS</u>		
0 -130.6m:			DACITE LAVAS Strongly bleached. Two 0.2m bands of tuffaceous sediments @ 38.7m & 41.5m. Minor to 2% py. Persistent sp-gn-cp in qtz-carb veins, locally 1-2% basemetal sulphides over 1-2m.		
130.6 -162.5m:			DACITIC TUFF Apparent fine pyroclastic with feldspar xyls & rare tiny lithic frags. Strongly bleached. Minor to 2% py. Minor sp-gn veins.		
162.5 -178.6m:			PARTLY-DEFORMED RHYODACITE LAVA Bleached & sericitised. Mod-strongly cleaved & finely cracked. Common qtz-carb veins. Basal contact a 100mm qtz vein (no sign of Mt Black Thrust usually in this position. Minor to 2% py.		
			<u>178.6 - 365.65m: HANGINGWALL EPICLASTICS</u>		
178.6 -334.9m:			ALTERED & DEFORMED CRYSTAL-LITHIC EPICLASTICS Sst to fine breccia. Bands of fine tuffaceous sediment mark the tops of debris-flow pulses. Gen minor py-sp-gn-arseno-cp in veins. Best: 3-4% py-sp-gn-cp-arseno, @ 311.35 -313.65m.		
334.9 -343.05m:			FELSIC LAVA? Silicified feldspar-phyric volcanic. 1-2% py, minor arsenopy.		
343.05 -356.4m:			FINE CRYSTAL-LITHIC SANDSTONE Strongly altered & moderately cleaved. 1% py-sp-gn-arsenopy.		
356.4 -365.65m:			INTENSELY DEFORMED BANDED CARBONATE-QUARTZ-SERICITE ROCK Schist & cataclasite composed largely of calcite. Poss after vitric tuffaceous sediments. V minor py, trace sp-gn-cp.		
365.65 -366.6m:			ROSEBERY FAULT Puggy crushed and broken rock - mainly black shale. Minor py.		
			<u>366.6 -412.5m: DUNDAS GROUP SEDIMENTS</u>		
366.6 -412.5m:			CHAMBERLAIN SHALE Deformed black pyritic shale and fine grey quartzose sst. Some deformation poss soft-sediment type. Sst increasing with depth.		
			<u>END OF HOLE</u>		



From m	Interval m	Code	Description	Depth	Graphic
FACING					
		MB, L	5 cm		
		MB, V			
			MT BLACK VOLCANICS		
		MB, L			
↑			HANGINGWALL EPICLASTICS		
↑					
		HW, V			
↑					
↑		HW, V			
?↓					
↓		HW, V			
			HANGINGWALL EPICLASTICS		
?↓		HW, V			
			DUNDAS GROUP SEDIMENTS		
		DG, S			

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. BY 2

PROJECT MT BLACK EL 12/88

Graphic Scale 1 : 500

CORE RECOVERY

From m	Interval m	%	RQD

DESCRIPTION

From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)

0 - 178.6m: MT BLACK VOLCANICS

0 - 130.6m: DACITE LAVAS

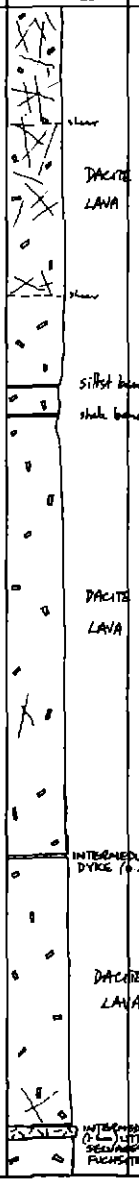
Lithology: Fawn with pink tinge in places & v minor greenish-grey intervals.
Med gr, hard, massive, even-grained & uniform, feldspar-porphyritic volc. Felds av 1-2mm, in felsic groundmass. Felds commonly weakly lineated (& occasionally deformed) by cleavage.
Some poss flow-banding in places.
V minor tiny chloritised ferromag laths (prob hornblende).
38.6 -38.75m: Band of pale grey TUFFACEOUS SILTSTONE, sharp contacts: upper 37°/LCA, lower 30°/LCA. 41.4 -41.6m: Band of pale grey TUFFACEOUS SHALE, sharp contacts 37°/LCA. Both sediment bands appear in place with normal depositional contacts, but no obvious change in character of dacite adjacent to them.
INTERMEDIATE DYKES (fi-med gr with chilled selvages, bleached, cleaved & cut by the mineralized veins) @ 86.35 -86.75m (upper contact 40°/LCA, lower 45°/LCA in opp sense), & @ 113.6 -115.0m (upper 35°/LCA same sense as cleav, lower irreg, minor fuchsite alt).
Alteration: Weak oxidation to 22.2m - sl leaching & limonite on fracts.
Most notable alt is strong bleaching, with assoc(?) pervasive mod-strong carbonatisation & weaker sericitisation. This appears to be overprinting earlier mod silica-albite alt.
Overall, alt is fairly strong & locally strong enough to detexture the rock.
Minor patchy chloritisation - mainly above 40m.
Trace fuchsite below 59m.
Carbonatisation dec to weak below 100m.
Common qtz-carb veins, to 250mm, av 5mm.
Structure: Gen weakly cleaved, becoming mod-strong below 121.5m.
Cleavage: 45°/LCA @ 10m & 44.5m, 30°/LCA @ 25.7m & 68.5m, 50°/LCA @ 81m, 40°/LCA @ 98m, 55°/LCA @ 113.5m & 122.5m.
Gen unbroken, except above 22.2m, where mod fractured & broken with several small shears (esp 19 -22.2m: 25% water loss here). 100% water loss in fracture @ 75.6m. Sl broken by fracts below 120m.
Shears 30°/LCA @ 11.9m & 29.7m. Shear 80°/LCA (opp sense to cleav), @ 121.5m. Shear @ 126.2m: 70°/LCA (same sense as cleav).
Basal contact transitional but fairly abrupt, 40°/LCA.

Sampling: 032777: 40.3 -41.3m (A -Petrology @ 40.3m, B -W.R.Geochem).
032778: 88.25 -89.25m (W.R.Geochem).

130.6 - 162.5m: DACITIC TUFF

Lithology: Similar rock type to above, but much liner grained with prominent cleavage and frags of feldspar & lithics.
Creamy-fawn, with pink tinge 133 -149.5m.
Fi-med gr. Massive. Hard.
Sandy, fairly even-textured volc with abund feldspars to 2mm, av 1mm or less. Many felds appear sl abraded & some smaller felds are xyl frags.
V minor unidentifiable tiny silic lithic frags av 1-2mm, rarely to 5mm. 5mm frag of pumice @149.5m.
Rock is finer gr & more vitric below 155m.

Depth (m) | Graphic Lithology | Struct.



MINERALISATION

0 - 22.2m:
Limonite on fractures.
Trace dissem pyrite (best assoc with chlorite alt).
Rare sp-gn in qtz-carb veins.

22.2 - 45m:
Minor to 1% dissem>>veinlet pyrite (1-2% py in tuff band @ 38.7m).
Rare py>cp in qtz-carb veins.

45 - 121.5m:
Minor dissem & veinlet pyrite, locally 1%.
Persistent mineralized qtz-carb veins, containing sp>py-cp-gn, sometimes in massive clots to 20 x 10mm.
These veins quite common, esp in intervals 64 -76.5m & 90 -121.5m, where sulphs locally total 1-2% over 1-2m.
These veins at all angles but gen at high angle to LCA & opp sense to the weak feldspar lineation.
At 55m, 12mm semi-massive sp>py-gn>cp veinlet, 85°/LCA.
At 74.6m: 13mm qtz-carb>py>cp-arseno vein, 65°/LCA.

121.5 -124.3m:
2% dissem & veinlet py.
Trace cp.

124.3 - 130.6m:
Minor to 1% dissem & veinlet py. Trace cp-sp-gn in qtz-carb veinlets.

130.6 - 151.6m:
Minor to 1% dissem py, with v minor sp>gn-cp in qtz-carb veinlets.

151.6 - 158.75m:
1-2% pyrite & marcasite, dissem & in tiny dendritic veinlets.

CODES

LITHO	STRUCT	ALTN	MIN

5 cm

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. BY 2

PROJECT: MT BLACK EL 12/88

Graphic Scale 1: 500

CORE RECOVERY

From m	Interval m	%	RQD

DESCRIPTION

From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)

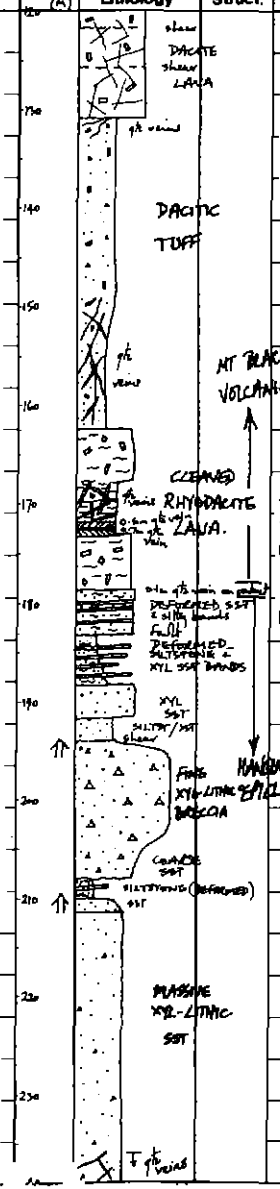
Alteration: Mod-strong bleaching, esp below 149.5m.
Mod sericite-silica-albite alteration, with patchy weak carbonatisation & chloritisation.
Albitisation mod 133 -149m, elsewhere gen weak or absent.
In places felds are silif or have silica reaction rims.
Abund carb>>qtz veinlets (av <5mm) and common qtz>carb veins (av 50 -250mm). Latter most common in the bleached zones, ie: above 133m and below 149.5m.
Structure: Mod to strong cleavage (prob after 1° attitude, although no sign of layering):
45°/LCA @ 134m, 50°/LCA @ 145m, 60°/LCA @ 157.5m,
55°/LCA @ 162m,
SI broken by fracts 151.5 -159m.
Basal contact gradational.

Sampling: 032779: 135.25 -136.25m. (A -Petrology, B -W.R.Geochem).

162.5 - 178.6m: PARTLY-DEFORMED RHYO-DACITE LAVA
Lithology: Pale khaki-fawn. Hard. Fi-med gr.
A moderately tectonically deformed feldspar-phyric volc similar to that above 130m except for presence of small qtz phenos.
Abund feldspars to 2mm, av 1-2mm, and minor qtz phenos av 1mm or less.
Finer-gr zones in interval 167 -173m are prob due to locally-stronger deformation, but may originally have been tuffaceous horizons.
Alteration: Mod sericitised & bleached, with lesser silif and trace assoc albitisation.
Weak-mod carbonatisation, best expressed by myriads of tiny irreg carb veinlets, but also pervasive.
Unit characterised by v common carb>qtz veins (gen <5mm), and numerous large (+50mm) barren qtz>carb veins below 168m (esp 168 -173.35m, where veins to 700mm). Minor chlorite assoc with some of these larger veins.
Structure: 1° rock texture partly tectonically disrupted and modified, with moderate to locally-strong cleavage: 40°/LCA @ 164.5m, 50°/LCA @ 175m.
Extensive fine cracking and local brecciation. Some delexturing, apparently due to shearing, in qtz-veined zone 167 -173m.
Largely unbroken.
Basal contact a 100mm unbroken barren qtz vein 90°/LCA.

Sampling: 032780: 175.5 -176.5m (A -Petrology, B -W.R.Geochem).

178.6 - 208.05m: TUFFACEOUS SILTSTONE, CRYSTAL SANDSTONE & FINE CRYSTAL-LITHIC BRECCIA
Lithology: Gen greenish-fawn. Pale pink 195 -200.5m.
A downhole-coarsening debris-flow sequence, at top comprising intercalated deformed & cleaved feld>>qtz xyl sst & lesser tuffaceous siltstone, passing below194m into cleaved feld=qtz xyl-lithic breccia



MINERALISATION

158.75 - 158.85m:
7-10% sp-gn>cp in mass of thin irreg veinlets

158.85 - 162.5m:
1% dissem py, trace sp-gn.

162.5 -173.6m:
1% dissem py, locally 2% (eg: 162.5 -163.5m).

173.5 - 178.6m:
Minor dissem py.

CODES

LITHO	STRUCT	ALTN	MIN

5 cm

069018

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

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PROJECT MT BLACK EL 12/88

Graphic Scale 1 : 500

CORE RECOVERY				DESCRIPTION						CODES			
From m	Interval m	%	RQD	From m	Interval m	(incl LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN

Breccia is coarsest 199-205m, with angular to subangular clasts to 30mm (av 5-8mm). Below 205m, breccia fines down to coarse sst at base. Lithics mainly strongly silica-albite alt fi gr or feld-porph felsic lavas. Small pumice frags noted at 201.5m.

Alteration: Above 195m, mod sericite>chlorite-silica-carb alt.
195 -202m, strong silica-albite>sericite alt.
Below 202m, mod sericite-bleaching>silica-carb-chlorite alt.
Ubiquitous irreg veinlets, veins & patches of carb (dolomite? or ankerite?). Lesser reg veins of barren qtz (>>carb) to 350mm.
Minor fuchsite alt 195.5 -196.5m.

Structure: In the finer-grained (& originally bedded) section above 188.5m, very strong tectonic deformation of 1° layering & texture by brecciation & cleavage (incl local crenulation). Feld xyls commonly stretched & deformed in this zone.
Deformation is less strong below 188.5m although there is still a fairly well-developed tectonic fabric (rocks here were originally more massive).
Shears, all same sense as cleav & on or adjacent to lithological changes, (eg: sst to siltst): 50°/LCA @ 180.4m, 70°/LCA @ 182.9m, 35°/LCA @ 194m. Mod broken around lower two shears, elsewhere largely unbroken.
Strongly cleaved: 55°/LCA @ 179.6m, 58°/LCA @ 184.7m, 40°/LCA @ 198.5m, 55°/LCA @ 203m.
Basal contact irreg & highly deformed.

SAMPLING: 032788: 180.75m (Petrology). 032789: 189.25m (Petrology).

178.6 - 188m:
Inc in small grains of leucoxenized oxides.
1-2% dissem py, patchy & tending to dec with depth.

188 -193.5m:
2% dissem py.

193.5 - 208.05m:
V minor dissem py, dec with depth.

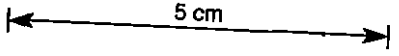
208.05 - 211.35m: DEFORMED BLACK TUFFACEOUS SILTSTONE & MASSIVE FINE SANDSTONE

Lithology: Dark grey and fawn.
Sedimentologically, the fine-grained top on the unit beneath.
Highly deformed & irreg intercalations of dark grey/black sericitic siltstone (with characteristic abund fine qtz>carb veins), and massive fine feld>qtz xyl sst (with relatively minor fine qtz-carb veining).
Siltst predom in uppermost 2m. Below this, siltst largely confined to irreg small lumps in massive sst.
Dark colour in siltst due to trace carbonaceous material. Sst comprises xyls & xyl frags <1mm in sericitic matrix after vitric component.

Alteration: Both rock types mod-strongly pervasively carb alt (Mn-calcite? or dolomite?). Weak-mod sericitisation. V minor local silif.

Structure: Originally bedded - this highly deformed by mod-strong cleavage @ 40-50°/LCA (bedding now oriented // cleav).
Fold nose @ 209.25m.
Sl coarsening of grainsize in sst towards basal contact.
Basal contact deformed & essentially gradational.

208.05 - 211.35m:
V minor dissem py.
V minor sp>gn-py in qtz-carb veins below 210m.



211.35 - 258m: MASSIVE CRYSTAL-LITHIC SANDSTONE

Lithology: Gen pale greenish-grey. Pinkish-fawn above 222m & 250 -254m. Med gr, hard, unbroken.
Granular rock after massive structureless sst, apparently the upper half of a debris-flow of which unit beneath is the lower section.

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

PROJECT MT BLACK EL 12/88

Graphic Scale 1: 500

CORE RECOVERY				DESCRIPTION						CODES			
From m	Interval m	%	RQD	From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth (m) / Graphic Lithology / Struct.	MINERALISATION		LITHO	STRUCT	ALTN	MIN

Made up largely of abund packed feld xyls & xyl frags (av <2mm), with lesser smaller qtz xyl grains, & minor lithic frags av 2-5mm, to 10mm.
Identifiable lithics are silif finely feld-porph lavas.

Alteration: 1° texture greatly obscured by alteration.
Mod to strong silica-sericite-carb (-bleaching) alt throughout (strongest towards top & bottom sections of unit), with assoc albitisation above 222m & 250 -254m.
Patchy chloritisation, mainly 224 -227m & 240.5 -242.5m.
Mod pervasive carb alt, but most carb in abund thin irreg carb veinlets & veins typically <10mm. Carb has only mod reaction to HCl and weathers to yellow-orange colour (Mn calcite? or dolomite?).
Lesser thicker more-reg qtz>carb veins, gen +10mm (to 250mm), becoming inc common below 236m.

Structure: Rock is v even-grained until below 250m, where xyl grainsize coarsens v sl, with assoc inc in av size & number of lithic frags.
Weak-mod cleavage (many xyls fractured by the tectonic fabric).
Cleav: 35°/LCA @ 213m & 217.5m, 55°/LCA @ 230m, 45°/LCA @ 239m & 252m, 40°/LCA @ 245m.
Basal limit arbitrary - a v gradational coarsening to rock type below.

Sampling: 032781: 220.5 - 221.5m (W.R.Geochem).

Mineralisation: 211.35 - 244.15m: Ubiquitous minor to 1% dissem py.

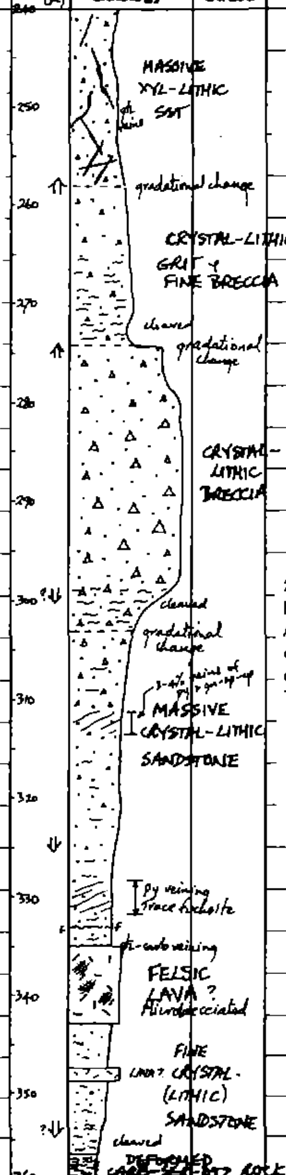
258 - 303m: CRYSTAL-LITHIC BRECCIA

Lithology: Pale pink to pale greenish-grey. Hard to v hard.
An overall downward-coarsening debris flow pulse, with 3 recognisable parts that merge one into another:
a) Upper section of xyl-lithic grit to fine breccia.
Abund abraded xyl grains & frags of qtz & feld av 1-2mm, (qtz to 5mm), in fi gr silica-sericite matrix.
Lesser lithic frags (silica-albite alt lavas), angular to subangular, av 5mm or less, to 15mm max. Lithics becoming inc abund & larger with depth.
This sub-unit coarsens abruptly at 274.15m into:
b) Gen open-frameworked xyl-lithic breccia, with abund angular to subrounded lithics (mainly silica-albite alt variable felsic lavas, also tuffaceous types incl rare mafic tuff), to 120mm, (av 15-30mm), & occ highly deformed clasts & small rafts of pale grey cherty siltst/shale to 300mm thick (mainly between 282.5 -285.5m).
Lithics occur in qtz-feld xyl sst matrix (xyl grains av 1-2mm).
c) Below 298.75m, breccia fines gradually downwards to xyl-lithic grit at base. Lithic frags are fewer & smaller (av <10mm, to 40mm).
Both lithics & feld-qtz xyls commonly show sl signs of abrasion, with broken xyls & angular xyl frags. Occ large sl rounded qtz grains to 8mm.
At 302.2m, 70 x 35mm shale frag with small feld xyls (growths?).

Alteration: Mod to locally v strong silica>sericite-bleaching alt (+-albite or chlorite). Alt sufficient to partly obscure 1° texture.
Common carb & qtz-carb veins (not as abund as in unit above).
Minor pervasive carb alt.
Persistent trace fuchsite below 274m.

Structure: Rock partly deformed by mod lineation - apparently 1° flow texture overprinted by cleavage. This has partic deformed the siltst/shale clasts, suggesting they were unlithified when incorp into unit. Lineation strongest 265 -

Mineralisation: 258 - 303m: Minor dissem pyrite. At 281m, 25mm clast of massive py. 15mm ditto @ 289.9m. Trace vein sp-gn below 280m. 10mm vein massive py @ 298.05m, 70°/LCA (opp sense to cleav).



5 cm

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. BY 2

PROJECT MT BLACK EL 12/88

Graphic Scale 1 :

CORE RECOVERY				DESCRIPTION						CODES			
From m	Interval m	%	RQD	From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN

274.5m (the basal section of the liner upper part of the unit), and in basal 3-4m.
Cleavage/1° lineation: 40°/LCA @ 267m, 281m & 296m. 35°/LCA @ 288m. Orientated core readings: @ 271.5m: cleav 38°/LCA (dip 80° to 266°M); @ 301.5m: cleav 43°/LCA (dip 84°to 260°M).
Largely unbroken except for around fault 15°/LCA (same sense as cleav), centered @ 277.5m.
Basal 'contact' rather arbitrary - no obvious base to debris-flow unit as it grades to unit below.
Sampling: 032782: (W.R.Geochem) @ 272.25 -273.25m.

303 - 334.9m: CRYSTAL-LITHIC SANDSTONE

Lithology: 1° texture very indistinct due to alteration & deformation.
Pale creamy-fawn with greenish-grey intervals.
Hard, massive, med gr granular rock with grainsize tending to dec below approx 323m.
Abund qtz & feld xyl grains, av 1-2mm with occ qtz to 6mm (these gen subrounded). Few xyls are euhedral - most are sl rounded or fragmented, either by abrasion or corrosion & deformation.
Much lesser lithic frags (mostly silica-albite alt felsic lavas), gen subangular, av <5mm, rarely to 35mm in upper part of unit.
All in fi gr silica>sericite matrix.
V rare pumice frags.
Alteration: Mod to strong silica-bleaching>sericite-carb alteration.
Minor chloritisation in places.
Carb (Mn-calcite or dolomite?) largely in tiny veinlets or in larger irreg, occ banded, qtz-carb veins (to 120mm). Veinlets & veins most abund below 331.5m. Gen only minor pervasive carb alt.
Trace fuchsite alt 328.5 -331.7m, assoc with zone of py veining.
Structure: Mod cleaved: 33°/LCA @ 316m & 327m.
Orientated core reading: @ 304.5m: cleav 35°/LCA (dip 76° to 263°M).
Gen unbroken. Sl broken 330 -334.2m around fault 65°/LCA @ 333.2m.
Basal contact indistinct due to irreg zone of qtz-carb veining.

Sampling: 032783: 327 -328m (W.R.Geochem).
032784: (Assay) @ 311.35 - 312.4m.
032785: (Assay) @ 312.4 - 313.65m.

334.9 - 343.05m: FELSIC LAVA?

Lithology: 1° texture indistinct due to strong alteration.
Pale creamy grey. Hard. Med gr. Massive & even-textured.
Indistinct white feldspars, av 1-2mm, in silica-flooded groundmass.
No qtz xyls or lithic frags noted.
Alteration: V strongly silicified, with assoc strong bleaching-sericite-carb alteration.
Carb (Mn-calcite or dolomite?), in v common tiny veinlets or larger veins (+-qtz). Minor patches of pervasive carb alt.
Minor chlorite veinlets around fault @ 342m.
Structure: Unit is finely brecciated throughout by abund microfractures gen filled with carb or sericite. Weak cleavage.
At 342m, 80mm chlorite-cemented fault breccia 70°/LCA.
Basal contact indistinct due to zone of irreg qtz-carb veining

303 - 311.3m:
Minor pyrite, trace sp-gn.
Mostly as veins to 10mm in opp sense to cleav.
These veins often assoc with chlorite or qtz-carb veins.

311.35 - 313.65m:
3-4% py>gn-sp-cp>arseno, vein-style & assoc with zone of local chloritisation.
Sulph veins gen in opp sense to cleav & often assoc with brecciated qtz-carb veins.
Largest sulph vein is @ 311.4m: 20mm, 60°/LCA.

313.65 - 334.9m:
Minor to 1% pyrite - dissem & vein-style as before.
V minor gn & grey sulphide - prob a Bi or Ag sulphosalt.
Best veins (all opp sense to cleav):
318m: 10mm py, 60°/LCA.
330.15m: 8mm py, 60°/LCA.
330.7m: 10mm massive py with trace cp, 70°/LCA.
331.1m: 5mm py, 75°/LCA, with minor grey sulph.
(Several other py veins <5mm in zone 328.5 -331.5m).
333.2 -333.4m (assoc with fault): several veins 3-15mm of massive grey sulph.

334.9 - 343.05m:
1-2% persistent dissem py, with minor dissem & veinlet arsenopy.

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. BY 2

PROJECT: MT BLACK EL 12/88

Graphic Scale 1:

CORE RECOVERY				DESCRIPTION						CODES			
From m	Interval m	%	RQD	From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
						Sampling: 032786: (A -Petrology, B -Assay & W.R.Geochem), @ 336.5 -337.5m.								
						343.05 - 356.4m: FINE CRYSTAL (-LITHIC) SANDSTONE				343.05 - 356.4m: Minor to 1% py>sp-gn-arsenopy>cp, both dissem & in veinlets.				
						Lithology: Pale creamy-fawn. Hard.								
						1° texture v indistinct due to strong alteration. Microfractured interval from 347.5 -348.8m appears similar to lava(?) unit above.								
						Fi-med gr massive granular rock, composed largely of feld xyl grains, av 1mm, to 2mm, with lesser & smaller qtz grains.								
						All in fi gr silica-sericite matrix, poss originally vitric.								
						Minor lithic grains, gen approx 2-3mm, rarely to 10mm. Lithics mostly felsic lavas (often pyritic).								
						Both xyls & lithics appear abraded & fragmented - few xyls are euhedral.								
						Alteration: Strong silica-sericite-carb-bleaching alteration.								
						Carb (Mn-calcite or dolomite?), in abund veinlets, diffuse vein-like patches, & veins (latter +- qtz, to 120mm). Minor pervasive carb.								
						Rare trace fuchsite throughout.								
						Structure: Unbroken.								
						Mod cleaved, becoming more cleaved with depth.								
						Cleavage: 45°/LCA @ 344m, 40°/LCA @ 350m, 60°/LCA @ 355m.								
						@ 351.5m: shear 53°/LCA (same sense as cleav).								
						Grainsize dec over basal 2-3m.								
						Basal contact abrupt - along cleavage, 75°/LCA.								
						356.4 - 365.65m: INTENSELY DEFORMED CARBONATE-QUARTZ--SERICITE ROCK				356.4 - 365.65m: V minor dissem py & trace sp-gn-cp.				
						Lithology: Pale yellowish-cream.								
						An intensely deformed & disrupted, irreg-banded and variably-textured rock. Now composed largely of granular carbonate (calcite) with lesser qtz & sericite. Gen fi gr but with sandy-textured intervals, in highly irreg intercalations.								
						This texture appears largely tectonically-induced.								
						Fi gr bands display intense cleavage & stretching, and sandy zones are apparently cataclasite, with silic frags 1-3mm in matrix of granular calcite with lesser qtz & sericite.								
						Originally poss a bedded sequence of vitric silty to shaley tuffaceous sediments, given unit's banded & variable-grainsize nature, & presence (mainly in basal 5m), of occ thin disrupted bands to 15mm of silif black shale.								
						Alteration: Highly calcareous due to v strong pervasive carbonatisation. Strong silicification, sericitisation & bleaching.								
						Notable almost total lack of veining - all carb is dispersed.								
						Structure: V strong tectonic fabric - has retextured rock & modified 1° textural features.								
						Cleav angle sl variable - gen 65 -70°/LCA.								
						Orientated cleavage measurements: @ 361.5m: 42°/LCA (vertical, striking 280°M). @ 361.9m: 60°/LCA (dips 78° to 030°M).								
						Bands of black shale all orientated 65 -70°/LCA (in cleav).								
						Largely unbroken.								
						Basal contact the sharp upper boundary of the Rosebery Fault zone proper: 55°/LCA (// cleav)								

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. BY 2

PROJECT: MT BLACK EL 12/88

Graphic Scale 1: 500

Sampling: 032787: (A -Petrology, B -W.R.Geochem), @ 363 -364m.

365.65 -366.6m: ROSEBERY FAULT

100mm of pug & crushed rock at top of zone marks main fault plane - top contact 55°/LCA, lower 75°/LCA - both // cleav.
Below pug zone, rock type is deformed, brecciated & highly qtz-veined black graphitic shale, badly broken with common irreg zones of pug.
Qtz veining is irreg, brecciated & abund micro-fractured. Some carb & minor sericite assoc with the qtz.
Cleav/shearing angles in lower part of fault zone: 70°/LCA.

366.6 - 412.5m: DEFORMED BLACK SHALE AND QUARTZOSE SANDSTONE (CHAMBERLAIN SHALE)

Lithology: Dark grey to black.
Deformed interbeds of fine sst (60%) and black shale (40%), with sst becoming inc common below 399m.
Shale carbonaceous & sl graphitic (esp in deformed zone at top of unit).
Sst is fine-med gr & v even-grained (no grading), qtzose, micaceous, mildly calcareous, & gen contains some carbonaceous material.
Alteration: Essentially unaltered.
Structure: Sequence originally gen finely-bedded, with some sst in massive bands up to 2.5m thick (massive sst most common below 399m).
Bedding: 58°/LCA @ 385m, 394.5m & 405.5m. Reading @ 394.5m is orientated core: dip 80° to 089°M.
Bedding gen deformed, with shale squeezed into wispy vein-like forms, & common brecciation of sst incl rotated thinly-bedded sst blocks in black shale matrix.
Some of this deformation appears to be of soft-sediment type.
Deformation is strongest in upper 10m, with brecciation of sst, strong cleavage/shearing of shale, & abund fractures filled with calcite-qtz veinlets & veins (some veins also deformed & brecciated).
Cleavage @ 371.5m: 58°/LCA.
Veining dec with depth.
Sl broken down to 385m, gen unbroken below this.

END OF HOLE

Depth (m): 360, 370, 380, 390, 400, 410, 420

Graphic Lithology: DEFORMED + BANDED CARBONATE-QTZ-SERICITE ROCK (faulted + cataclastic); ROSEBERY FAULT (Pug + crushed rock); fractured and veined (qtz-carb); CHAMBERLAIN SHALE (v deformed); ↑ predominantly massive sst; E.O.H. 412.5m

Struct.

MINERALISATION:
365.65 - 366.6m: 1-2% dissem py.
366.6 - 395m: Minor to 1% dissem py.
395 - 412.5m: V minor dissem py.

5 cm

CODES: LITHO | STRUCT | ALTN | MIN

ASMINCO EXPLORATION
DIAMOND DRILL CORE ASSAY DATA

HOLE No. BY 2

PROJECT : BASTYAN DAM, MT BLACK EL 12/88

SAMPLE						ASSAYS (ppm unless specified)																				COMMENTS
																%								%		
Number	Type	From m	To m	Interval m	Recovered m	Cu	Pb	Zn	Ag	Au	As / Ba	Rb / Sr	V / Nb	Y / Zr	Al_2O_3 / SiO_2	TiO_2 / Fe_2O_3	MnO / Na_2O	CaO / K_2O	MgO / P_2O_5	L.O.I. / SO_3	Bi	
0327778	SPLIT NQ	40·3	41·3	1·0	1·0	7	5	44	<1		4 / 740	140 / 170	60 / 11	25 / 200	13·26 / 64·6	0·45 / 4·43	0·26 / 2·43	3·52 / 2·99	1·42 / 0·118	6·29 / 0·11	<5	
032778	" "	88·25	89·25	1·0	1·0	51	34	292	<1		3 / 810	160 / 140	65 / 8	25 / 190	13·36 / 64·0	0·47 / 4·25	0·25 / 1·94	3·74 / 3·42	1·36 / 0·120	6·73 / 0·12	<5	
0327798	" "	135·25	136·25	1·0	1·0	7	7	34	<1		5 / 740	160 / 75	12 / 15	35 / 280	13·17 / 72·0	0·31 / 2·34	0·16 / 2·12	1·87 / 3·18	0·87 / 0·039	4·83 / 0·14	<5	
032780B	" "	175·5	176·5	1·0	1·0	8	10	39	<1		<2 / 930	190 / 85	60 / 8	35 / 200	13·58 / 65·5	0·44 / 3·55	0·25 / 1·13	3·34 / 4·01	1·46 / 0·105	6·30 / 0·21	5	
032781	" "	220·5	221·5	1·0	1·0	5	12	21	<1		8 / 820	140 / 170	35 / 7	35 / 270	13·22 / 65·7	0·54 / 3·30	0·25 / 2·22	3·73 / 3·89	1·47 / 0·185	6·12 / 0·56	<5	
032782	" "	272·25	273·25	1·0	1·0	5	<3	26	<1		5 / 1050	180 / 70	10 / 12	40 / 260	13·77 / 72·7	0·31 / 2·18	0·09 / 1·08	1·37 / 3·72	1·14 / 0·038	3·24 / 0·32	<5	
032783	" "	327·0	328·0	1·0	1·0	7	4	23	<1		16 / 1300	180 / 80	20 / 15	45 / 310	14·90 / 69·1	0·37 / 2·35	0·14 / 1·56	1·72 / 3·83	1·41 / 0·045	4·23 / 0·15	<5	
032784	" "	311·35	312·4	1·05	1·05	437	1228	1558	2	<0·008												
032785	" "	312·4	313·65	1·25	1·25	116	456	476	1	<0·008												
0327868	" "	336·5	337·5	1·0	1·0	7	12	26	<1	<0·008	190 / 400	55 / 230	30 / 7	30 / 270	13·13 / 69·5	0·53 / 2·56	0·14 / 5·49	2·38 / 1·11	0·95 / 0·107	3·39 / 0·81	<5	
0327878	" "	363·0	364·0	1·0	1·0	27	4	21	<1		7 / 1050	140 / 160	15 / 9	30 / 230	11·46 / 62·4	0·32 / 4·25	0·37 / 1·68	5·30 / 2·69	2·03 / 0·052	8·95 / 0·04	<5	

Laboratory ANALABS COBER + PERTH		Analytical-Method	AAS	AAS	AAS	AAS	F/A	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	
Job-No. 8185 (PAS 6K)	Date MAY 1992	Detection-Limit	2	3	2	1	0.008	2 / 10	5 / 5	5 / 3	5 / 5	0.05 / 0.1	0.01 / 0.01	0.01 / 0.01	0.01 / 0.01	0.01 / 0.01	0.01 / 0.01	0.01 / 0.01	5	

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. BY 2

PROJECT: MT BLACK EL 12/88

Graphic Scale 1:

CORE RECOVERY, MAGNETIC SUSCEPTIBILITY + S.G. MEASUREMENTS

CORE RECOVERY				M.SUS	S.G			
FROM	TO	REC	%REC	DEPTH	M.SUS	DEPTH	WEIGHT	VOL	S.G
0	3	2.7	90.00	3	0.13				0.00
3	4.3	1.3	100.00	4.3	0.13				0.00
4.3	5.8	1.35	90.00	5.8	0.12				0.00
5.8	7.5	1.7	100.00	7.5	0.09				0.00
7.5	10.5	3	100.00	10.5	0.07				0.00
10.5	12.2	1.7	100.00	12.2	0.13				0.00
12.2	13.5	1.3	100.00	13.5	0.15				0.00
13.5	14	0.5	100.00	14	0.27				0.00
14	16.5	2.4	96.00	16.5	0.18				0.00
16.5	19.5	3.00	100.00	19.5	0.19				0.00
19.5	22.2	2.25	83.33	22.2	0.18				0.00
22.2	25.3	3.1	100.00	25.3	0.17				0.00
25.3	28.4	3.1	100.00	28.4	0.25				0.00
28.4	31.5	3.1	100.00	31.5	0.14				0.00
31.5	34.5	3	100.00	34.5	0.19				0.00
34.5	37.5	3	100.00	37.5	0.18	40	622	255	2.44
37.5	40.5	3	100.00	40.5	0.2				0.00
40.5	43.5	3	100.00	43.5	0.14				0.00
43.5	46.5	3	100.00	46.5	0.19				0.00
46.5	49.5	3	100.00	49.5	0.19				0.00
49.5	52.5	3	100.00	52.5	0.16				0.00
52.5	55.5	3	100.00	55.5	0.21				0.00
55.5	58.5	3	100.00	58.5	0.21				0.00
58.5	61.5	3	100.00	61.5	0.13				0.00
61.5	64.5	3	100.00	64.5	0.15				0.00
64.5	67.5	3	100.00	67.5	0.14				0.00
67.5	70.5	3	100.00	70.5	0.18				0.00
70.5	72.3	1.8	100.00	72.3	0.13				0.00
72.3	73.5	1.2	100.00	73.5	0.13				0.00
73.5	75.6	2.1	100.00	75.6	0.17				0.00
75.6	76.5	0.9	100.00	76.5	0.15				0.00
76.5	79.5	3	100.00	79.5	0.15				0.00
79.5	82.5	3	100.00	82.5	0.14	80	721	262	2.75
82.5	85.5	3	100.00	85.5	0.14				0.00
85.5	88.5	3	100.00	88.5	0.18				0.00
88.5	91.5	3	100.00	91.5	0.22				0.00
91.5	94.5	3	100.00	94.5	0.13				0.00
94.5	97.5	3	100.00	97.5	0.17				0.00
97.5	100.5	3	100.00	100.5	0.24				0.00
100.5	103.5	3	100.00	103.5	0.12				0.00
103.5	106.5	3	100.00	106.5	0.03				0.00
106.5	109.5	3	100.00	109.5	0.13				0.00
109.5	112.5	3	100.00	112.5	0.11				0.00
112.5	115.5	3	100.00	115.5	0.17				0.00
115.5	118.5	3	100.00	118.5	0.12				0.00
118.5	121.5	3	100.00	121.5	0.08	120	763	278	2.74
121.5	123.7	2.1	95.45	123.7	0.1				0.00
123.7	126.7	3	100.00	126.7	0.09				0.00
126.7	127.5	0.9	112.50	127.5	0.11				0.00
127.5	130.5	2.85	95.00	130.5	0.12				0.00

CORE RECOVERY				M.SUS	S.G			
FROM	TO	REC	%REC	DEPTH	M.SUS	DEPTH	WEIGHT	VOL	S.G
130.5	133.5	3	100.00	133.5	0.1				0.00
133.5	136.5	3.1	103.33	136.5	0.18				0.00
136.5	139.5	2.9	96.67	139.5	0.13				0.00
139.5	142.5	3	100.00	142.5	0.08				0.00
142.5	145.5	3	100.00	145.5	0.03				0.00
145.5	148.5	3	100.00	148.5	0.19				0.00
148.5	151.5	3	100.00	151.5	0.09				0.00
151.5	152.7	1.1	91.67	152.7	0.07				0.00
152.7	154.5	1.7	94.44	154.5	0.02				0.00
154.5	157.5	3	100.00	157.5	0.04				0.00
157.5	160.5	3	100.00	160.5	0.09	160	502	187	2.68
160.5	163.5	3	100.00	163.5	0.11				0.00
163.5	166.5	3	100.00	166.5	0.06				0.00
166.5	169.5	2.95	98.33	169.5	0.07				0.00
169.5	172.5	3	100.00	172.5	0.05				0.00
172.5	175.5	3	100.00	175.5	0.1				0.00
175.5	178.5	3	100.00	178.5	0.04				0.00
178.5	181.5	3	100.00	181.5	0.09				0.00
181.5	184.5	2.9	96.67	184.5	0.09				0.00
184.5	187.5	3	100.00	187.5	0.18				0.00
187.5	190.5	3	100.00	190.5	0.14				0.00
190.5	193.5	2.85	95.00	193.5	0.42				0.00
193.5	196.5	3	100.00	196.5	0.1				0.00
196.5	199.5	3	100.00	199.5	0.05				0.00
199.5	202.5	3	100.00	202.5	0.05	200	704	256	2.75
202.5	205.5	3	100.00	205.5	0.1				0.00
205.5	208.5	2.95	98.33	208.5	0.09				0.00
208.5	211.5	3	100.00	211.5	0.08				0.00
211.5	214.5	3	100.00	214.5	0.05				0.00
214.5	217.5	3	100.00	217.5	0.07				0.00
217.5	220.5	3	100.00	220.5	0.13				0.00
220.5	223.5	3	100.00	223.5	0.1				0.00
223.5	226.5	3	100.00	226.5	0.11				0.00
226.5	229.5	3	100.00	229.5	0.07				0.00
229.5	232.5	3	100.00	232.5	0.15				0.00
232.5	235.5	3	100.00	235.5	0.18				0.00
235.5	238.5	3	100.00	238.5	0.06				0.00
238.5	241.5	3	100.00	241.5	0.1	240	480	175	2.74
241.5	244.5	3	100.00	244.5	0.05				0.00
244.5	247.5	3	100.00	247.5	0.04				0.00
247.5	250.5	3	100.00	250.5	0.05				0.00
250.5	253.5	3	100.00	253.5	0.06				0.00
253.5	256.5	3	100.00	256.5	0.06				0.00
256.5	259.5	3	100.00	259.5	0.06				0.00
259.5	262.5	3	100.00	262.5	0.11				0.00
262.5	265.5	3	100.00	265.5	0.11				0.00
265.5	268.5	3	100.00	268.5	0.02				0.00
268.5	271.5	3	100.00	271.5	0.07				0.00
271.5	274.5	3	100.00	274.5	0.05				0.00
274.5	277.5	2.95	98.33	277.5	0.05				0.00

CORE RECOVERY				M.SUS	S.G			
FROM	TO	REC	%REC	DEPTH	M.SUS	DEPTH	WEIGHT	VOL	S.G
277.5	280.5	3	100.00	280.5	0.08	280	591	218	2.71
280.5	283.5	3	100.00	283.5	0.09				0.00
283.5	286.5	3	100.00	286.5	0.04				0.00
286.5	289.5	3	100.00	289.5	0.09				0.00
289.5	292.5	3	100.00	292.5	0.1				0.00
292.5	295.5	3	100.00	295.5	0.09				0.00
295.5	298.5	3	100.00	298.5	0.09				0.00
298.5	301.5	3	100.00	301.5	0.05				0.00
301.5	304.5	3	100.00	304.5	0.03				0.00
304.5	307.5	3	100.00	307.5	0.09				0.00
307.5	310.5	3	100.00	310.5	0.12				0.00
310.5	313.5	3	100.00	313.5	0.1				0.00
313.5	316.5	3	100.00	316.5	0.09				0.00
316.5	319.5	3	100.00	319.5	0.09				0.00
319.5	322.5	3	100.00	322.5	0.11	320	536	196	2.73
322.5	325.5	3	100.00	325.5	0.1				0.00
325.5	328.5	3	100.00	328.5	0.1				0.00
328.5	331.5	2.95	98.33	331.5	0.06				0.00
331.5	333.7	2.15	97.73	333.7	0.12				0.00
333.7	336.7	2.8	93.33	336.7	0.06				0.00
336.7	337.5	0.8	100.00	337.5	0.06				0.00
337.5	340.5	2.9	96.67	340.5	0.09				0.00
340.5	343.5	3	100.00	343.5	0.06				0.00
343.5	346.5	3	100.00	346.5	0.11				0.00
346.5	349.5	3	100.00	349.5	0.19				0.00
349.5	352.5	3	100.00	352.5	0.17				0.00
352.5	355.5	3	100.00	355.5	0.17				0.00
355.5	358.5	3	100.00	358.5	0.16				0.00
358.5	361.5	3	100.00	361.5	0.04	360	423	153	2.76
361.5	364.5	2.9	96.67	364.5	0.09				0.00
364.5	366.3	1.8	100.00	366.3	0.13				0.00
366.3	368.6	2.3	100.00	368.6	0.04				0.00
368.6	370.5	1.7	89.47	370.5	0.04				0.00
370.5	373.5	3	100.00	373.5	0.04				0.00
373.5	376.5	3	100.00	376.5	0.05				0.00
376.5	379.5	3	100.00	379.5	0.04				0.00
379.5	382.5	3	100.00	382.5	0.17				0.00
382.5	385.5	2.9	96.67	385.5	0.03				0.00
385.5	388.5	3.1	103.33	388.5	0.08				0.00
388.5	391.5	3	100.00	391.5	0.04				0.00
391.5	394.5	3	100.00	394.5	0.09				0.00
394.5	397.5	3	100.00	397.5	0.1				0.00
397.5	400.5	3	100.00	400.5	0.03	400	472	176	2.68
400.5	403.5	3	100.00	403.5	0.1				0.00
403.5	406.5	3	100.00	406.5	0.09				0.00
406.5	409.5	3	100.00	409.5	0.09				0.00
409.5	412.5	3	100.00	412.5	0.11				0.00

PASMINCO EXPLORATION
DIAMOND DRILL HOLE SUPPLEMENTARY DATA

HOLE No. BY 2

PROJECT :

032777A Dacitic Dyke BY2, 40·2m

A fine to medium grained equigranular rock broadly dacitic in composition.

Mineralogy	%
Quartz	20
Plagioclase	59
Sericite	10
Chlorite	1
Carbonate	10
Secondary Fe Oxides	<1

This sample is dominated by interlocking aggregates of subhedral to euhedral plagioclase crystals (0.1 - 2 mm) with appreciable quantities of anhedral interstitial quartz. The plagioclase is twinned and displays weak concentric zoning. It also displays some alteration to sericite, particularly along fractures and patchy alteration to carbonate.

In addition, there are a few dispersed aggregates of chlorite which may be replacing original ferromagnesian phases, a few anhedral grains of pyrite (0.1 mm) and dispersed grains (0.1 - 0.15 mm) of secondary iron oxides possibly after magnetite microphenocrysts. The sericite frequently occurs in fine veinlets defining one moderate cleavage. The rock is traversed by several narrow (0.1 - 0.25 mm wide) veins rich in carbonate and quartz which also contain minor pyrite.

The medium grained character and interlocking textures displayed by this rock suggest relatively slow cooling as a moderate sized intrusive body. The presence of abundant plagioclase and moderate quantities of quartz with evidence for only a small quantity of ferromagnesian phases suggests a composition between dacite and andesite.

032779A Dacitic Lava BY2, 135·25m

A porphyritic plagioclase-phyric silicic (dacitic) lava with moderate sericitic and carbonate alteration.

Mineralogy	%
Plagioclase	60
Quartz	20
Sericite	10
Carbonate	10
Pyrite	<1
Secondary Fe Oxides	<1

Euhedral to subhedral plagioclase crystals (0.1 - 1.5 mm) are the only phenocryst phase present. These generally appear unzoned and display weak sericitic and patchy carbonate alteration. Most of the sericite and patchy carbonate alteration is fairly evenly dispersed throughout the fine grained (0.01 - 0.02 mm) groundmass. This is dominated by fine laths of plagioclase which are weakly aligned depicting original flow banding, and interstitial anhedral quartz. There is no petrographic evidence for amygdales in this specimen.

The fine sericite occurs as interconnecting fine veinlets which are strongly aligned depicting a single cleavage. The carbonate occurs as disseminated individual grains (0.01 - 0.1 mm) and aggregates of grains.

The rock is also traversed by several veins (0.1 - 2 mm wide) rich in relatively coarse grained (up to 0.2 mm) quartz and minor carbonate and pyrite. The quartz in several of these veins occurs as recrystallised grains with sutured margins which are elongated in the cleavage suggesting that they were introduced pre-deformation. In contrast, several other veins do not display evidence of recrystallisation during the major Devonian deformation.

The even distribution of euhedral to subhedral plagioclase phenocrysts in a fine grained silicic groundmass is best interpreted as indicating a lava of broadly dacitic composition.

032780A Rhyolitic/Rhyodacitic Lava BY2, 176·5m

A sparsely porphyritic rhyolitic lava which has experienced substantial sericitic and carbonate alteration.

Mineralogy	%
Feldspar	35
Quartz	30
Sericite	25
Carbonate	10
Pyrite	<1
Secondary Fe Oxides	<1
Zircon	trace

This rock consists of euhedral to subhedral partially resorbed phenocrysts of quartz (0.2 - 0.5 mm), and euhedral plagioclase phenocrysts (0.5 - 2 mm) in a strongly altered and recrystallised silicic groundmass. Twinning is still evident in some feldspar phenocrysts but others are almost completely replaced by fine intergrowths of sericite. These more altered phenocrysts may have been alkali feldspar. There are no chlorite-rich aggregates which might have indicated the presence of ferromagnesian phenocrysts.

The groundmass consists of recrystallised quartz and feldspar aggregates (typically 0.05 - 0.15 mm), but the feldspar has been substantially altered to sericite which has been recrystallised during deformation into fine intergranular veinlets which define one reasonably distinct cleavage. However, the rock is not strongly deformed as plagioclase twin lamellae are not bent, and quartz phenocrysts do not display undulose extinction or subgrain development or other features indicative of recrystallisation under high strain conditions. Some quartz-feldspar aggregates display a vague sector-type extinction suggestive of recrystallised spherulites. However, this is not an obvious or well-developed feature.

Patchy carbonate alteration occurs throughout the groundmass, but most of the carbonate occurs with introduced quartz in cross-cutting veins (0.05 - 0.5 mm wide). These veins clearly cut and post-date the cleavage. There are a few scattered grains of pyrite and zircon and some secondary Fe oxides.

The distinctly porphyritic character of this rock with euhedral quartz and feldspar phenocrysts evenly distributed throughout a silicic groundmass provides the best support for the interpretation that this was a lava of rhyolitic to rhyodacitic composition.

032786A Volcaniclastic sandstone/mass flow deposit BY2, 336·5m

Most likely a poorly sorted volcaniclastic sandstone composed of abundant angular feldspar grains in a fine, recrystallised feldspathic matrix.

Mineralogy	%
Plagioclase	75
Quartz	10
Carbonate	8
Sericite	4-5
Chlorite	<1
Pyrite	2-3
Leucoxene after sphene	<1
Zircon	trace

This sample is composed of abundant angular to subrounded plagioclase crystals (0.3 - 2 mm) which sometimes occur in aggregates dispersed in a fine grained (0.01 - 0.1 mm) matrix composed predominantly of recrystallised xenoblastic plagioclase and subordinate quartz. The plagioclase grains generally display very weak sericite and clay alteration with occasionally more extensive patchy replacement by carbonate. The matrix feldspar is predominantly unaltered.

Most of the alteration is concentrated along distinct interconnecting fractures which imparts a brecciated appearance to the whole rock. The major alteration phases along the fractures are sericite and carbonate, but there are also aggregates of quartz with carbonate, and quartz with chlorite. Neither the sericite or the chlorite in these veinlets is strongly aligned suggesting that the alteration is post-deformation, or that this sample somehow was shielded from recrystallisation during deformation. The former interpretation is preferred as the character of this alteration (ie. not pervasive) differs from the sericitic alteration evident in the majority of other samples examined from this area. In many other respects this could be interpreted as a phenocryst-rich dacitic lava. The matrix is relatively fine grained and homogeneous and there is a lack of lithic clasts of discrete character. However, the evidence favouring a clastic origin for this sample includes the angular to subrounded character of the plagioclase grains and the lack of euhedral or partially resorbed phenocrysts.

Pyrite grains (0.02 - 0.1 mm) are disseminated throughout the rock and do not appear to be closely associated with the other alteration assemblages in the fracture-vein systems. There are also dispersed grains of leucoxene after rutile or sphene through the matrix and a trace of residual zircon.

The poorly sorted and matrix supported nature of this rock suggests that it represents some sort of rapidly deposited submarine mass-flow unit. In addition, the absence of a variety of lithic clasts and angular nature of the grains suggest that it was probably locally sourced from a single parental rock type. This was most likely a fine hyaloclastite deposit of dacitic composition which included fragmented phenocryst material and abundant silicic ash.

PETROLOGICAL SAMPLE DESCRIPTIONS

PROJECT: MT. BLACK EL 12/88

PASMINCO EXPLORATION
DIAMOND DRILL HOLE SUPPLEMENTARY DATA

HOLE No. BY 2

PETROLOGICAL SAMPLE DESCRIPTIONS

032788 Volcaniclastic sandstone BY2, 180.75m

A clastic rock composed of silicic lithic fragments, detrital quartz and possible chlorite pseudomorphs after plagioclase set in a relatively fine grained silicic matrix which has been extensively altered to sericite, carbonate and quartz.

Mineralogy	%
Quartz	44
Sericite	30
Chlorite	10
Carbonate	10
Pyrite	1

This is an extremely altered silicic rock, in which the original textures are largely masked by alteration. However, there are several features which suggest that this rock is from part of the quartz-phyric hangingwall in the Rosebery sequence rather than the Mt Black Volcanics. Firstly, there appear to be some relic subhedral crystals of quartz which retain partial resorption embayments. These occur with chlorite aggregates, some of which have a distinctive tabular form, that suggests they may be pseudomorphs of feldspar grains. In addition, there are several rounded xenoblastic aggregates of quartz (0.1 - 0.2 mm) which closely resemble recrystallised lithic fragments previously described from the hangingwall epiclastics. In a few instances, these occur adjacent to relatively fine grained (0.02 - 0.05 mm) xenoblastic matrix quartz that may represent a recrystallised silicic ash component.

Much of the remaining matrix material has been extensively replaced by broad patches of sericite, and to a lesser extent, carbonate. The sericite displays two oblique directions of weak preferential alignment with one of these being dominant throughout the section. In addition, there has been significant addition of silica as veins and relatively coarse grained (0.2 - 1 mm) patches which are associated with the carbonate alteration.

In summary, although many of the primary textural features of this rock are obscured by alteration, the observable mineralogy and textures suggest it is part of the Rosebery hangingwall sequence.

032787A Dacitic Lava BY2, 364m

Probably a dacitic lava which has been deformed and extensively carbonate altered with subordinate sericite alteration.

Mineralogy	%
Quartz	65
Plagioclase	3-5
Carbonate	25
Sericite	5
Secondary Fe Oxides	<1

Relics of fractured, subhedral and twinned plagioclase phenocrysts (0.3 - 1 mm) are recognisable through the strong carbonate and sericite alteration in this rock. There are also a few relatively large grains of quartz (0.2 - 0.3 mm) with subidiomorphic forms which may be relict phenocrysts. However there are similar sized grains occurring throughout the matrix in aggregates which are related to quartz veining and are clearly secondary in origin.

The least altered portions of the groundmass consist of very fine grained (0.01 - 0.05 mm) aggregates of xenoblastic quartz with fine sericite and carbonate. Considerable portions of the groundmass have been replaced by aggregates of carbonate and quartz, and to a lesser extent, fine veinlets of sericite. Quartz and carbonate occur in irregular relatively coarse grained aggregates (0.1 - 0.3 mm) and also in cross-cutting veins (0.1 mm wide). The sericitic alteration appears to be most developed in the more strongly sheared parts of the rock. In these areas the sericite shows two oblique directions of preferred orientation.

Despite the extensive quartz, carbonate and sericite alteration of this sample, the recognition of apparently subhedral plagioclase phenocrysts in a relatively homogeneous silicic groundmass (least altered portion), suggests that this was originally a lava of dacitic composition.

032789 Very Altered Volcaniclastic Sandstone BY2, 189.25m

A strongly silica and sericite altered silicic volcaniclastic rock with minor disseminated pyrite and quartz-carbonate veining.

Mineralogy	%
Quartz	63
Sericite	30
Carbonate	5
Chlorite	<1
Pyrite	2
Zircon	trace

The primary textures in this sample are also very largely obscured by the effects of hydrothermal alteration. However, there are a few euhedral to subhedral quartz 'phenocrysts' (up to 1.5mm) remaining which display partial resorption embayments. In addition, there are a significant number of ovoid to rectangular aggregates (1-2mm) of xenoblastic quartz grains which appear to be pseudomorphs after feldspar crystals. Individual grains in these aggregates are relatively coarse (0.1-0.2mm), and are characterised by sutured margins.

The matrix is dominated by fine sericite, xenoblastic quartz, several aggregates of chlorite, carbonate and disseminated pyrite. The sericite often occurs in irregular patches with no strong preferred orientation, although some subparallel veinlets and patches characterised by platy alignment indicate the presence of a weak cleavage. The chlorite aggregates are closely associated with carbonate, and are probably a breakdown product of a primary phase. The quartz in the matrix appears to be relatively coarse grained (0.1-0.2mm) aggregates similar to those pseudomorphing feldspar crystals, but the matrix quartz is more intimately intergrown with sericite. The section is also traversed by several quartz veins (0.1-1.5mm wide), one of which contains significant carbonate.

Many of the recrystallised quartz aggregates in the matrix of this specimen resemble the relatively coarse grained recrystallised volcanic lithic fragments in sample 032788A. Although the matrix of this specimen does'nt display the same degree of heterogeneity as sample 032788A possibly because the alteration is more intense, it has closer mineralogical and textural affinities with 032788A than 032790A. Consequently, I favour the interpretation that this sample is also a silicic epiclastic rock. The resorbed quartz phenocrysts are likely to occur within porphyritic lithic fragments, and the quartz pseudomorphs after feldspar crystals are likely to be reworked clastic felspar grains.