HOLE No. MM1/MM1a

PASMINCO EXPLORATION
DIAMOND DRILL CORE RECORD

LOCATION	TASMANIA
PROJECT	TULLAH EL 22/90
PROSPECT	MURCHISON MINE
DESIGNED BY	J.G. PURVIS
LOGGED BY	J.G. PURVIS
RELOGGED	
COMMENCED	14·1·93
COMPLETED	19·2·93
DRILLED BY	W. HOW
DRILL RIG	LONGYEAR 38

OBJECTIVE

TO LOCATE POSTULATED CAMBRIAN VOLCANOGENIC SOURCE OF THE REMOBILIZED BASEMETAL SULPHIDES IN THE DEVONIAN LODE AT THE MURCHISON MINE.

RESULT

HOLE MM1 ABORTED AT 60m AFTER LIFTING SHARPLY AND RECOMMENCED FROM 18m AS HOLE MM1a.
NO SIGNIFICANT MINERALIZATION INTERSECTED.
FARRELL SLATES SEQUENCE ENCOUNTERED TO 267·5m, AND ALTERED RHYODACITIC VOLCANICLASTICS AND LAVAS OF MURCHISON VOLCANICS BELOW 267·5m. UNMINERALIZED MURCHISON MINE HOST ROCK INTERSECTED 218–237m.

LOCATION/SURVEY DATA (AMG)

Grid	AMG		RL Collar m 178·7
Northing m	S 376487·1		Bearing Collar 102°
Easting m	385432·9		Dip Collar −70°
DH Survey Type	SINGLE SHOT EASTMAN CAMERA		Length Hole m 400·7m

Depth m	Bearing	Dip	Depth m	Bearing	Dip
MM1: (0–60m)					
30	099·5°	−65·25°			
60	098°	−60·25°			
MM1a: (18–400·7m)					
30	100·5°	−67·5°			
61	101·5°	−66·75°			
91	100°	−65°			
121	097·5°	−63°			
151	096°	−59·75°			
181	096°	−56·75°			
211	097·75°	−55°			
241	097·25°	−53·25°			
271	098·5°	−52°			
301	098°	−50°			
331	097°	−49°			
361	097·5°	−48·5°			
391	097°	−48°			

SIGNIFICANT INTERSECTIONS

From m	To m	Interval m	Pb	Zn	Ag			Comments
351·6	352·85	1·25	0·09%	0·15%	2 g/t			BEST INTERSECTION: TUFFACEOUS SILTSTONE BAND IN MURCHISON VOLCANICS.

SIGNIFICANT CORE LOSS

From m	To m	% Lost

POOR GROUND CONDITION ZONES

From m	To m	Condition
0	8	FLUVIOGLACIAL SAND AND WEATHERED BROKEN SHALE

HOLE SIZE

Size	Depth m
HQ	69
NQ	400·7

HOLE CONDITIONS AFTER COMPLETION

Collar	STEEL CAP SCREWED INTO CASING CEMENTED AT GROUND SURFACE
Steel Casing	6·5m OF HW-SIZED GALVANIZED STEEL CASING PLACED IN TOP OF HOLE
PVC Casing	40mm ID UNSLOTTED PVC PLACED TO BASE
Ground Water	
Wedge	
Drill Pad	

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HASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. MM1

PROJECT: MURCHISON MINE, TULLAH EL 22/90

Graphic Scale 1: 200

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
						0 - 60.0m: FARRELL SLATES								
						0 - 5.5m: NO CORE								
						5.5 - 15.85m: PREDOMINANTLY DARK GREY SHALE **Lithology:** Partly carbonaceous & sericitic shale, with common interbeds of calcareous siltstone & v minor fine sandstone. **Alteration:** Essentially unaltered - sericite after degradation of vitric component, not hydrothermal alteration. Irreg barren qtz-carb vein 14 -14.35m. Minor carb veinlets. **Structure:** Generally thinly & regularly bedded. Bedding 38°/LCA @ 7m. Weak-mod cleavage (bedding //). Slight kinking in places. Broken, worst above 8m. Basal contact sharp (bedding plane) 43°/LCA.								
						15.85 - 18.85m: FINE VOLCANICLASTIC SANDSTONE **Lithology:** Grey, mod calcareous. Massive appearance, but slight variations in grainsize indicate unit comprises several pulses of detritus. Composed of feldspar > qtz & lithic grains, av <1mm, in sl sericitic and carbonaceous shaley matrix. Abund tiny wisps of deformed black shale. Bands of fine stretched-pebble conglomerate @ 16.05 - 16.25m & 17 -17.1m. (Pebbles comprise tuffaceous shale, cherl, carbonate & black shale. Up to max 10-20mm long & <5mm wide). **Alteration:** Essent unaltered. Feldspar grains carbonatised. Minor carb veinlets. **Structure:** Mod cleaved, with minor kinking. Basal contact sharp (bedding) 43°/LCA.								
						18.85 - 57.0m: CALCAREOUS SILTY TO SANDY SHALE **Lithology:** Dark grey. A mod calcareous fi gr sed, comprising subordinate silt to sand-sized feldspar, qtz and silic lithic grains scattered in dark grey to black, partly-carbonaceous & sl sericitic shaley matrix. Some qtz xyl grains to 4mm. Occ fine massive sst bands - largest 30.65 - 32.3m. **Alteration:** Carbonatisation of feldspar grains. Common veinlets (& lesser veins) of carb > qtz, gen in cleavage.								

5 cm

5.5 - 15.85m:

2% py-po, locally up to 3-5% (core weakly magnetic).
Fi gr dissem & v thin stringers along cleav.

15.85 - 18.85m.

Minor to 1% dissem py.

18.85 - 57.0m:

Gen 1% py>po, fi gr dissem. Varies from minor to +2%.

Trace cp in places.

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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
						Minor chlorite-sericite alteration assoc with carb-qtz veinlets in kink zones below 43m.				Minor coarse xylline sp>gn-py>cp in qtz-carb veinlets in axis of kink zone //LCA, 43-49m.				
						Structure: Bedding: 55°/LCA @ 24.2m (orientated core: dips 75° to 270° AMG), 48°/LCA @ 27.2m (orientated core: dips 72° to 261° AMG), 46°/LCA @ 37m, 57°/LCA @ 57m.	50	Silty to sandy shale						
						Bedding gen indistinct due to bedding-// mod-strong cleavage and assoc deformation (unit characteristic).	52	Kinks // LCA ± trace sp-cp		Similar (same?) kink zone @ 52 - 56.75m, with minor py & trace cp-sp.				
						Common augen of carb &/or qtz, av 2-3mm, up to 20-30mm. Most augen after deformed carbonatised feldspars.	54							
						Locally stronger deformation around kink zones sub-// LCA @ 43 - 49m & 52 - 56.75m.	56							
						Sl broken, esp 20 -22.5m & 55.7 - 56.25m. Qtz-healed breccia after weak fault @ 30.7m.	58	Predominantly shale						
						Basal contact sharp (bedding/cleav) 60°/LCA.	60							
						57.0 - 60.0m: GREY CALCAREOUS SHALE				57 - 60m:				
						Lithology: Weakly carbonaceous & sl sericitic. Some siltstone component.				Minor to 1% py. Traces of sp & cp. Dissem & tiny stringers.				
						Alteration: Occ carb veins & veinlets.								
						Structure: Bedding gen irreg & deformed with small folds in places. Bedding 65°/LCA @ 59.5m. At 60m grading in siltstone bed fines uphole.								
						Weak-mod bedding-// cleavage.								
						END OF HOLE				5 cm				

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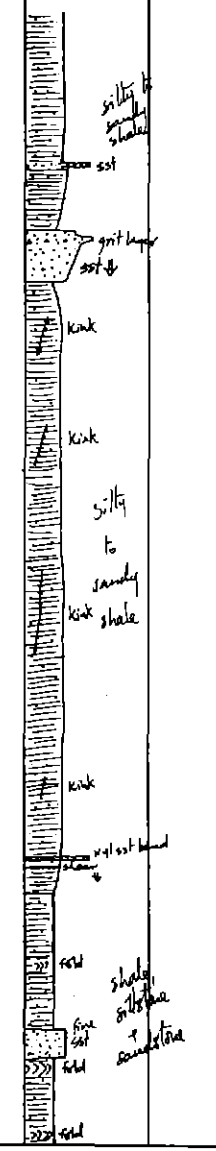
TASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. MM1a

PROJECT: MURCHISON MINE, TULLAH EL 22/90

Graphic Scale 1: 200

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
						Hole commences at 18m from underside of hole MM1. First core at 22.3m.							
						22.3 - 267.5m: FARRELL SLATES							
						22.3 - 57.25m: CALCAREOUS SHALEY SILTSTONE **Lithology:** Grey to dark grey. Predom fi-med gr mod calcareous sed comprising silty to sandy grains (gen abraded feldspar>qtz, av 1mm or less, with qtz occ to 4mm), in partly-carbonaceous shaley matrix. Trace graphite on cleavage. Characteristic 'spots' (1-2mm) & small augen (5-30mm) of calcite, some centered on carbonatised feldspar grains. Minor fine massive volcaniclastic sst bands - largest 30.75 - 32.75m (fining downhole). Downhole fining in sst @ 56.35m. Minor irreg intercalations & beds of med-coarse gr feld>>qtz xyl sst to 200mm. **Alteration:** Common carb>qtz veinlets (esp in kink zones), occ veins of same to 100mm. Trace sericite-chlorite alt assoc with some qtz-carb veinlets. **Structure:** Rock mod-strongly deformed by bedding-// cleav, which gen oblit the original fine bedding and causes marked stretching of grains, esp feldspar. Some soft-sed or diagenetic disruption of bedding, incl boudinaging of sst & rare intraformational folding. Bedding: 43°/LCA @ 32.75m; 52°/LCA @ 39m; 49°/LCA @ 51m. Series of kink zones at 0° to 15° to LCA below 35m, centered 44.8 - 47.3m. Unit gen unbroken to sl broken. Basal contact, bedding/cleav plane 57°/LCA.	22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		5 cm 22.3 - 57.25m: 1-2% ubiquitous fi gr dissem (& occ fine veinlets) py>>po. Trace sp-gn-cp, mostly as xylline blebs in qtz-carb veinlets assoc with kink bands.				
						57.25 - 151.25m: CALCAREOUS SHALE, SILTSTONE & FINE SANDSTONE **Lithology:** Grey thin shaley, silty & finely sandy beds, intercalated with partly-carbonaceous dark grey to black shale laminae 1-3mm. 35% shale, 40% siltst, 25% sst. Gen strongly calcareous (inc with depth), with some beds of impure limestone. Sst bands uncommonly to 1.5m thick, often with "cloudy" internal structure suggesting movement after deposition (current effects?). Obvious current bedding @ 125m & uphole-younging scour & fill @ 143.5m. Sst ungraded above 130m, occ graded (all uphole-fining) below 130m. **Alteration:** Trace sericite-chlorite alt assoc with veined & folded zones. Abund carb>qtz veinlets. Occ large qtz>carb-chlorite veins // cleav, esp 115.8 - 119.5m. These veins gen 100-200mm, up to 1m (88.1 - 89.1m), with brecciation & chloritisation of wall rocks evident on vein margins.	52 54 56 58 60 62 64 66 68		57.25 - 151.25m: Ubiquitous finely dissem po>py, & lesser tiny stringers of py>po // cleav. Sulphs vary from <1% in sst intervals, to 5% in shale/siltst intervals. Much of dissem po is drawn out along cleav. Irreg bedding-// pre-cleav calcite-po veins. Traces of cp>sp-gn in carb±qtz veinlets.				

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ASMINCO EXPLORATION
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CORE RECOVERY

From m	Interval m	%	RQD

DESCRIPTION

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

Structure: Unit is much less cleaved than unit above, but displays common apparent soft-sed deformation with pre-cleav v small-scale folding & microfaulting, esp in shale laminae 96.5 - 109m, & 119.5 - 125m (below veined zone). Thin sst beds often boudinaged.
Fold noses evident @ 60.5m, 64.3m, 67.6m, 103.8m, 122m (synclinal), 123.0 - 123.9m.
Deformation & folding decreases markedly below 130m.
Bedding: 67°/LCA (// cleav) @ 61.7m (orientated core: dips 47° to 254° AMG); 45°/LCA @ 76.5m (cleav 58°/LCA, same sense); 66°/LCA @ 95m; 68°/LCA @ 107m (// cleav); 70°/LCA @ 115m (// cleav); 65°/LCA @ 126m (// cleav); 69°/LCA @ 136m; 66°/LCA @ 147m (// cleav).
Basal contact sharp, bedding, 70°/LCA.

Sampling: 034230: 96 - 98m (For assay).
034231: 146 - 148m (Assay).

151.25 - 179.2m: PREDOMINANTLY TURBIDITIC SANDSTONE

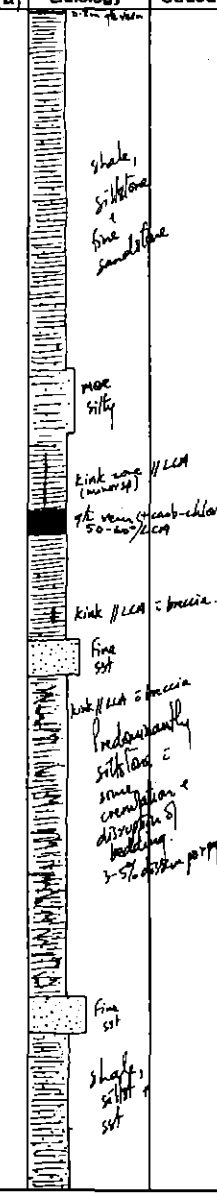
Lithology: Grey. Shale dark grey to black.
Strongly calcareous sequence, comprising numerous rhythmic bands of fi-med gr turbiditic sst (65%), & thinly bedded siltstone (20%)/shale (15%). Shale partly carbonaceous & gen not calcareous.
Sst bands to 1.25m (160.1 - 161.35m), gen 100 - 300mm. All fine uphole.
Basal parts of sst contain 1mm grains of feld>qtz, & stretched lithic grains (to 5mm) of cherty silica & fi gr seds (incl black shale).
Alteration: Minor carb veinlets.
Structure: Bedding gen regular & undeformed: some boudinaging of thin sst beds & occ microfaulting of shale.
Small-scale fold nose @ 169.6m.
Weak-mod cleavage, stretches lithic grains in sst.
Bedding: 70°/LCA @ 151.7m & cleav 40°/LCA, same sense (orientated core: bedding dips 50° to 232° AMG, cleav dips 82° to 276° AMG); 72°/LCA @ 162m; 64°/LCA @ 170.6m.
Largely unbroken - black shale intervals sl fissile.
Basal contact sharp, bedding, 65°/LCA.

179.2 - 218.05m: INTERBEDDED SHALE, SILTSTONE & SANDSTONE

Lithology: Grey to black.
Interbedded shale, siltstone & fine turbiditic sandstone, in equal proportions.
Sst beds to 700mm, av 100 - 200mm, all fining up hole.
Sst comprises grains of fi gr silic lithics, qtz, feldspar, minor mica, & tiny wisps of deformed black shale.
Shale variably carbonaceous - some true black shale with graphitic partings, eg: basal 4m of unit.

Depth (m)

Graphic Lithology / Struct.



MINERALISATION

Zones ≥ 3% sulphs:
95 - 104m:
3-5% po>py, mainly v fi gr dissem.
Trace sp-gn-cp in kink-breccia zone //LCA.
126 - 128.5m:
3% po>py.
141 - 144.5m:
3-5% po>>py, rare cp.
146 - 150m:
3-5% po>>py. Trace cp.

5 cm

151.25 - 179.2m:
Av minor to 1% po-py, fi gr dissem & stringers.
Sst gen contains minor dissem py. Shaley zones contain up to 3% fi gr po.

Best sulphs 3-5% po>py

173.3 - 174.5m, centered on kinked zone in black shale @ 173.85m.

179.2 - 180.5m:
Minor to 1% py-po, fi gr dissem.

180.5 - 181.5m:
3-5% po>py, v fi gr dissem & tiny stringers, in black shale interval.

CODES

LITHO	STRUCT	ALTN	MIN

27012

HOLE No. MM1a

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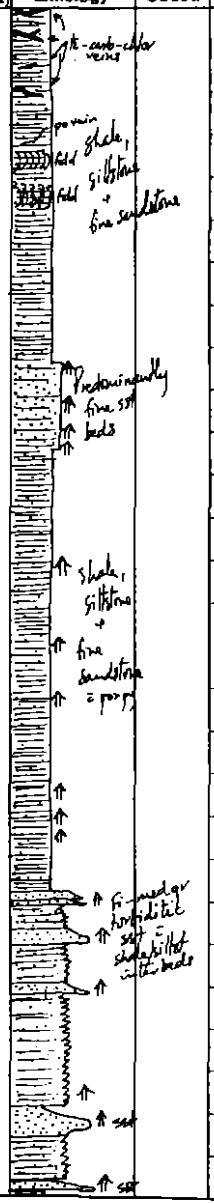
CORE RECOVERY				DESCRIPTION					CODES			
From m	Interval m	%	RQD	From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth (m)	Graphic Lithology / Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
						Mod-strongly calcareous, esp silty to sandy beds (some shale non-calcareous). Occ thin beds of impure limestone. Calcareous character is not present in faulted zone below 214m. **Alteration:** Essentially unaltered. Carb veinlets throughout, filling fracts at all angles but most commonly // cleav. Trace sericite-chlorite alt assoc with fault below 214m. **Structure:** Regularly bedded: 68°/LCA @ 181.7m (orientated core: dips 52° to 237° AMG); 65°/LCA (cleav 35°/LCA same sense) @ 191.6m; 75°/LCA (cleav 55°/LCA) @ 202.3m; 83°/LCA @ 211.8m. Weak-mod cleavage, stronger towards base. Sl to mod broken in some black shale zones. Fault 204.3 - 204.6m, 45°/LCA (// cleav). STRONG FAULT 214.1 - 216.5m, 60 - 75°/LCA (sub // bedding), centred on puggy crushed & broken zone @ 214.6 - 215.2m (some core loss). Basal contact sharp (bedding) @ 68°/LCA (cleav 57°/LCA, same sense). **Sampling:** 034232: 216 - 218m. (For assay).	118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150 152 154 156 158 160 162 164		181.5 - 191.2m: Overall approx 2% po>py. Varies from <1% py in some sst beds to 5% po in some black shales. Mainly v fi gr dissem. Occ po or py veinlets in narrow strongly cleaved zones in black shale. 191.2 - 204m: Minor to 1% po &py, Dissem. 204 - 206m: 1-2% py in veinlets mainly // cleav. 206 - 214m: V minor py>po, dissem & stringer. 214 - 218.05m: 3-4% py stringers & fi gr dissem. Single 3mm sp veinlet @ 217.5m. 218.05 - 224m: Minor dissem & stringer py>>po. Rare sp-gn, mainly assoc with carb veinlets. 224 - 235.5m: Trace py. 235.5 - 236.7m: 1-2% dissem & stringer py. Trace sp-gn.				
						218.05 - 236.7m: MASSIVE CRYSTAL SANDSTONE (MURCHISON MINE HOST ROCK) **Lithology:** Pale grey. Mod hard. Massive & uniform. Med gr. Loosely packed abraded feldspar>qtz xyl grains, in subordinate silic & sericitic matrix that contains possible fine pumice frags (?). Felds av 1-2mm, qtz ditto but towards base occ up to 7mm (v fractured). Grainsize fines uphole and uppermost 1.65m of unit comprises pale grey sericitic siltstone. Occ small deformed black shale frags & wisps along cleavage, becoming inc common & larger (to 70mm x 10mm) in basal 3m, where there are also similarly-sized lithics of qtz-phyric altered volcs. Black shale band 235.95 - 236.2m. **Alteration:** Weak qtz-sericite-chlorite-carbonate alteration. Matrix sl silicified. *Carb veinlets and minor qtz-carb veins, scattered throughout.* **Structure:** Gen unit lacks bedding. Bedding 54°/LCA at abrupt base of siltstone @ 219.7m, and 70°/LCA in black shale band @ 236m..							

5 cm

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ASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

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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
						Mod-strongly cleaved. Feldspars deformed in strongly sheared basal 1m of unit. Cleav: 68°/LCA @ 221m; 80°/LCA @ 230m; 60°/LCA @ 236.5m	166							
						Gen unbroken. Mod broken 223 - 223.5m (assoc with qtz-carb veined fault zone 20°/LCA), & in basal 1m (centred on fault zone @ 235.95m, angle unknown).	168			10mm semi-massive py & minor sp-gn, in carb gangue in fault zone @ 235.95m.				
						Basal contact sharp (sheared bedding plane), 67°/LCA.	170							
						Sampling: 034233: 235.5 - 236.7m (For assay).	172							
						034238: 227 - 228m (For lithogeochemistry).	174			5 cm				
						236.7 - 257.4m: INTERBEDDED SHALE, SILTSTONE & SANDSTONE	176							
						Lithology: Grey to black.	178							
						Black & grey partly carbonaceous & graphitic shale, thinly interbedded with variably calcareous grey siltstone & turbiditic sandstone. Minor thin impure limestone beds.	180			236.7 - 238m:				
						Black shale predominates above 246.5m, & sst 246.5 - 250m.	182			3-5% py, dissem & veinlets.				
						Sst varies from fine to coarse gr, comprising grains of fi gr sed lithics (most commonly silic, also black shale), qtz & feldspar xyls, carbonate & minor mica.	184			238 - 242m:				
						Grains gen 1mm or less, where coarser are highly stretched (to max 7mm long).	186			2-3% py, dissem & veinlets.				
						Alteration: Trace sericite-chlorite alteration in places.	188			242 - 257.4m:				
						Carb veinlets at all angles throughout. Rare larger veins of qtz-carb±chlor.	190			Minor to 1% py>po. Varies. Dec with depth.				
						Structure: Gen strongly cleaved, sub // bedding. In places shales are mildly kinked & folded on small scale. An inconspicuous 2nd cleav occurs at high angle to bedding .	192							
						Anticlinal fold axis indicated (but not visible in core), by reversal of fining in sst beds between 241m & 242m. Above 241m individual sst beds fine uphole, below 242m sst beds all fine downhole.	194							
						Bedding: 65°/LCA (// 1st cleav, 2nd cleav 15°/LCA, same sense) @ 241.7m (orientated core: bedding & 1st cleav dips 60° to 300° AMG, 2nd cleav dips 71° to 075° AMG); bedding 68°/LCA @ 249.5m & 251.8m (cleav 45°/LCA, same sense).	196							
						Unbroken except for uppermost 0.7m (continuation of strongly sheared zone at base of unit above).	198							
						Basal 'contact' deformed bedding 82°/LCA.	200							
						Sampling: 034234: 236.7 - 238m. (For assay).	202							
							204							
						257.4 - 267.5m: STRONGLY DEFORMED ZONE IN SHALE	206			257.4 - 267.4m:				
						Lithology: Grey & black.	208			Minor to 1% dissem & stringer py>>po.				
						Predom non-calcareous grey to black shale, thinly interbedded with strongly calcareous siltstone & fine sandstone. Minor impure limestone.	210							
						Below 264.7m, intercalations up to 300mm of bleached sericitised siltstone identical to that in top of Murchison Volcanics unit below.	212							

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ASMINCO EXPLORATION
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HOLE No. MM1a

PROJECT: MURCHISON MINE, TULLAH EL 22/90

Graphic Scale 1: 200

Alteration: Trace sericite-chlorite alteration in most-deformed zones. Common carb veinlets & lesser qtz-carb veins. These gen contain minor sericite & chlorite.

Structure: Unit characterised by very strong deformation, esp below 260m. Includes small scale folding, kinking & boudinaging of bedding; shearing & annealed brecciation (latter mainly towards base of unit).
Bedding variable, but most commonly around 62°/LCA, with strong bedding-// slatey cleavage. An inconspicuous 2nd cleav also present, approx 40°/LCA (same sense as bedding).
Several small puggy faults // bedding. Sl-mod fissile & broken.
Basal contact marked by 600mm annealed cataclasite with 100mm of fault breccia (70°/LCA) at base, with black shale frags cemented by qtz-carb-sulphides. This underlain by parallel 30mm puggy brittle fault.

Sampling: 034244: 260.25m. (For petrology/cleavage examination).

Trace sp-gn-cp, gen assoc with carb veinlets in highly deformed zones.

267.4 - 267.5m:

10% sp-gn-aspy -py, in annealed breccia zone.

5 cm

267.5 - 400.7m: MURCHISON VOLCANICS

267.5 - 283.0m: ALTERED SERICITIC SILTSTONE & CRYSTAL SANDSTONE

Lithology: Pale greyish-green.
Interbedded epiclastic sequence comprising med gr qtz-xyl sandstone & lesser bleached sericitic (vitric) siltstone. Upper 3.5m and basal 4m are dominated by the fi gr rocks.
Some grey to black shale in upper 3m, in places dismembered & incorp into sst.
Sst massive & uniform, with abund angular to sub-rounded qtz xyl grains, av 1mm or less, occ to 3mm, evenly distributed in lineated sericitic matrix containing deformed carbonatised feldspars and small pumice frags.

Alteration: Mod sericite-carbonate-chlorite-bleaching alteration.
Carb pervasive but also often conc into small diffuse patches, veinlets & occ qtz-carb-chlor veins to 50mm.

Structure: Bedding: 69°/LCA (// cleav) @ 270.7m (orientated core: dips 60° to 278° AMG); 70°/LCA @ 279.1m.
Mod-strong bedding-// cleavage. Unbroken.
267.8m: small fault 70°/LCA, // upper contact.
Basal contact abrupt, // bedding, 68°/LCA.

Sampling: 034235: 268 - 269m. (For assay).
034236: 269 - 270m. (For assay & lithogeochemistry).
034237: 270 - 271m. (For assay).

267.5 - 283m:

10% dissem py over 100mm @ top contact, otherwise minor py & rare sp-gn.

Minor grains of magnetite in sst, around 278m.
2-3% magnetite along cleav in basal 0.4m of unit.

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ASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. MM1a

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Graphic Scale 1: 200

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
						283.0 - 293.0: UNIDENTIFIED ALTERED QUARTZ-PORHYRITIC VOLCANIC **Lithology:** Probable lava or intrusive porphyry. Purplish-grey, pink & green. V hard. Unbroken. Massive coarse-gr volc. Uniform but with banded appearance due to alteration patches // cleavage. Subhedral (rarely euhedral) fractured qtz xyls av 1-3mm, occ to 5mm, scattered through silicified lineated fi gr groundmass. **Alteration:** Strong silica-albite alteration, with lesser magnetite-hematite & sericite-chlorite. Core gen at least weakly magnetic, locally mod-strongly magnetic below 285m. Several barren comb-structured qtz veins up to 150mm thick. **Structure:** Strong cleavage: 68°/LCA @ 286m. Basal contact abrupt, 90°/LCA.	262 264 266 268 270 272 274	seams Mostly blacke grey shale ± fault common crenulations thin tectonic breccia zones 0.6m fault breccia silst/sst 70°/LCA. xyl sst siltst xyl sst siltst MURCHISON VOLCANICS	283 - 293m: Several % v fi gr pervasive magnetite *in places*. Trace py. 5 cm				
						293.0 - 310.6m: QUARTZ-PHYRIC FINE EPICLASTIC VOLCANICLASTICS **Lithology:** Greenish-grey. Fi-med gr. *Sandy to silty textured, gen xyl-rich fine vitric volcaniclastics*, ranging from coarse xyl sst to tuffaceous siltstone/shale (minor). 1° texture gen indistinct due to alteration & cleavage deformation.	276 278 280 282	xyl sst Siltst sst	293 - 298.3m: Several % magnetite, mainly in threads // bedding/cleav. Minor py, often coarsely xylline & gen assoc with mag. At 298m: 5mm zone of sp veinlets 65°/LCA (// cleav).				
						Common xyl grains to 2-3mm, av 1mm or less, of angular to subrounded qtz & lesser, deformed, carbonatised feldspar. In highly vitric fi gr matrix, now alt to qtz-sericite-chlorite. Textural, compositional and grainsize variations confirm original layered nature of unit. Bedded in places. Upper 5.3m of unit comprises bedded fine to coarse gr qtz-xyl sst, clearly related to qtz-porphyritic unit above. **Alteration:** Mod qtz-sericite-chlorite-carbonate alt. Some chlorite-magnetite alt above 298.3m. **Structure:** Bedding: 68°/LCA @ 296m. Mod-strong bedding-// cleavage. Largely unbroken - minor fracturing below 306m. Basal contact sharp, 60°/LCA (1° layering/cleav). **Sampling:** 034239: 305 - 306m. (For lithogeochemistry).	284 286 288 290 292 294 296 298 300	altered - cleaved silt - qtz-porphyritic LAVA. xyl sst Fine sst/siltst Coarse xyl sst Fine sst/ Siltst/shale Fine sst	298.3 - 300m: Minor sp>gn-py, mainly in veinlets // cleav. Minor magnetite. 300 - 310.6m: Trace dissem py, po, sp.				
						310.6 - 333.6m: FINE PUMICEOUS VOLCANICLASTICS **Lithology:** Probably epiclastic. Similar to unit above except marked decrease in qtz xyls, and abund visible pumice frags. Greenish-grey. Fi-med gr, sandy to silty textured, strongly lineated rock. 1° features indistinct due to alteration & cleavage deformation.	302 304 306 308						

91053

ASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. MM1a

PROJECT: MURCHISON MINE, TULLAH EL 22/90

Graphic Scale 1: 200

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
						Largely comprises highly deformed finely comminuted tiny pumice frags, gen only up to a few mm long, but rarely to several tens of mm. Occ fi gr volc lithic frags ditto. Rock also contains highly deformed feldspars (av <2mm), and lesser, gen smaller, qtz xyl grains. Minor bands of grey tuffaceous siltstone/shale above 318m, largest: 316 - 316.3m. These bands contain best sulphides. **Alteration:** Mod-strong chlorite-sericite-carbonate alt. Numerous carb veinlets & small patches, minor larger qtz-carb veins. **Structure:** Strongly cleaved. Bedding in grey siltstone/shale: 70°/LCA @ 317.55m. Cleav: 62°/LCA @ 331.7m (orientated core: dips 9° to 262° AMG). Largely unbroken - minor fracturing in places. Small fault 60°/LCA (// cleav), @ 316m (top of siltstone band). Basal contact v indistinct & diffuse. **Sampling:** 034241: 336 - 337m (For lithogeochemistry).	310 312 314 316 318 320 322 324 326 328 330 332 334 336 338 340 342 344 346 348 350 352 354 356	fine xyl sst fine pumiceous volcaniclastics silst/shale fine pumiceous volcaniclastics amygdaloidal Dacitic lava or dyke sst fine sst volcaniclastic xyl-lithic sst/tuff silst/shale ± sp Coarse sst	310.6 - 316m: Trace dissem py, po & sp. 316 - 316.3m: 2% sp-po, thin stringers in cleav. 316.3 - 333.6m: V minor py>sp. Ubiquitous minor leucoxenised black grains (after mag?). 5 cm 333.6 - 347m: Minor py, trace sp> gn-cp. Dissem. Ubiquitous small grains of leucoxenised opaques. 347 - 351.6m: Minor py, & trace sp-gn-po. Dissem. 351.6 - 352.85m: 1-2% py, sp & po. Dissem & veinlets.				
						333.6 - 347m: DACITIC LAVA OR DYKE **Lithology:** Greenish-grey. Fi-med gr. Massive. Weakly lineated. Rather similar in overall appearance to units above & below, but has largely undeformed finely granular feldspar-phyric texture, lacks visible pumice, is much less strongly lineated & contains apparent stretched amygdales to 10mm of calcite & chlorite (best developed around 336.5m). Scattered small feldspar phenocrysts throughout, av 1mm. **Alteration:** Mod carbonate-chlorite alteration. Common veinlets & clots of carb. **Structure:** Mod cleaved. Largely unbroken. Basal contact diffuse & v hard to pick. **Sampling:** 034241: 336 - 337m. (For lithogeochemistry). 034245: 337.2m. (For petrology).				
						347 - 366.7m: ALTERED VARIABLE FINE EPICLASTIC VOLCANICLASTICS **Lithology:** Greenish-grey. Fi-med gr. 1° texture indistinct due to alt/deform. A variable layered sequence, predominantly pulses of vitric qtz-feld xyl (±pumiceous) sst, grading in places to fine lithic-rich breccio-conglomerate. Intercalated with finer volcaniclastic sst & vitric bedded tuffaceous siltstone/shale (latter 351.85 - 352.85m & 361.2 - 363.2m).				

97052

ASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. MM1a

PROJECT: MURCHISON MINE, TULLAH EL 22/90 Graphic Scale 1: 200

CORE RECOVERY

From m	Interval m	%	RQD

DESCRIPTION

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

Xyls av <2mm, pumice gen a few mm & highly deformed. Lithics angular to subrounded, gen <15mm, occ to 50mm. Incl: fi gr carbonate, fi gr silica, qtz-phyric volcs, & fi gr seds (incl rare black shale).
Pumiceous sst pulse 352.85 - 361.2m displays gradual coarsening below 358m to lithic-rich breccio-cong at base.

Alteration: Mod-strong carbonate-sericite-chlorite alteration. Sericitisation inc below 361m, approaching veined zone at base.
Common veinlets, small patches & occ thin laminae, of carb.
Several white & pale pink qtz>>carb-chlorite-albite veins below 363.2m, largest 363.9 - 364.5m, irreg margins - lower disrupts cleavage.

Structure: Deformed bedding visible in tuffaceous siltstone/shale zones: 65°/LCA @ 351.9m & 361.4m.
Mod-strong bedding-// cleavage, 63°/LCA @ 361.7m (orientated core: dips 73° to 270° AMG). Cleavage strength varies according to rock type: eg: pumiceous & vitric types are more cleaved, deformed & sericitic than xyl rich sst.
Sl fractured & broken in basal 6m, otherwise unbroken.
Basal contact irreg upper edge of large qtz vein, 80°/LCA.

Sampling: 034240: 351.6 - 352.85m. (For assay).
034242: 361.3 - 363.3m. (For assay & lithogeochemistry).

366.7 - 372.1m: ZONE OF QUARTZ-ALBITE VEINING

Lithology: White, pink & green.
Brecciated zone comprising:
75% irreg massive xylline qtz-albite>carb-chlorite vein material.
25% brecciated & fractured, strongly qtz-sericite-chlorite alt, fi gr sandy-textured volc containing abund 1mm fractured qtz & feld xyl grains.

Alteration: As above.

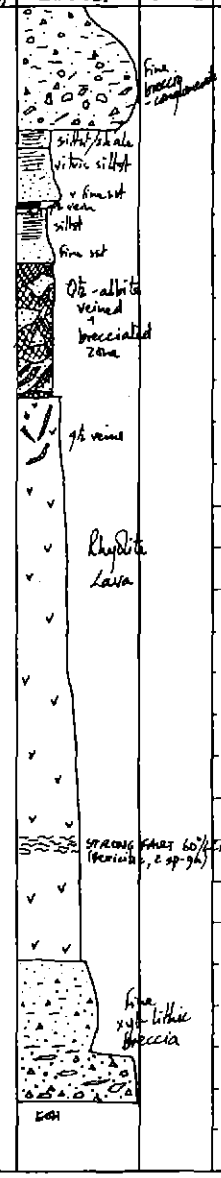
Structure: Sl broken. At base veins 15°/LCA - opp sense cleav.

372.1 - 395m: QUARTZ & FELDSPAR-PHYRIC VITRIC RHYOLITIC LAVA

Lithology: Pale fawny-grey. Massive. Hard.
Primary rock type almost unidentifiable due to alteration.
Finely granular, mod foliated, fairly uniform.
Qtz & feld xyls, av 1-2mm, occ to 3mm below 386m, in qtz-sericite-albite altered groundmass, that originally was highly vitric and has snowflake devitrification texture in places.
Below 389m occ tiny wispy grains - poss pumice.

Depth (m): 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400

Graphic Lithology / Struct.



MINERALISATION

352.85 - 360m:
Minor py, trace sp.

360 - 366.7m:
1% sp, po, py, gn.
Dissem, & stringers, also as grains in qtz veins.
Sp most common in siltst/shale zone 361 - 363.3m.
5mm sp-gn-qtz vein @ 363.25m
In basal 2-3m sulphs dec to minor, with trace arsenopy.

5 cm

366.7 - 372.1m:
Minor sp-gn>py, in clots in qtz veins & in small tension gash veinlets.

372.1 - 395m:
Minor but persistent dissem sp-gn-py.
Several % fi gr dissem sp-gn in fault @ 389.9 - 390.3m.

CODES

LITHO	STRUCT	ALTN	MIN

9710533

ASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

HOLE No. MM1a

PROJECT: MURCHISON MINE, TULLAH EL 22/90

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
						Alteration: Mod silica-sericite-albite-bleaching. Local strong silif.								
						Qtz-carb veinlets & veins throughout but no pervasive carb alt.								
						Occ thick qtz veins assoc with margin of unit above extend to 374.7m.								
						Structure: Weak-mod cleavage: 70°/LCA @ 385m & 395m.								
						Slight tectonic micro-fracturing & brecciation of rock fabric.								
						Badly broken in strong puggy and sericitzed fault 389.9 - 390.5m (60°/LCA								
						// cleav), otherwise unbroken.								
						Basal contact indistinct.								
						Sampling: 034246: 385.7m (for petrology).								
						395 - 400.7m: FINE CRYSTAL-LITHIC BRECCIA								
						Lithology: Grey-green. Massive. Unbroken. Foliated.								
						Abund matrix-supported angular to subangular frags, commonly stretched				395 - 400.7m:				
						& deformed, in matrix dominated by qtz xyls & fine pumice.								
						Frags include: v chloritic qtz-feld phyric volc, fi gr vitric volcs,				1% dissem po.				
						qtz, carbonate, tuffaceous siltstone & rare black shale.				Trace sp.				
						Frags gen 5-20mm, siltstone to +50mm. Matrix qtz xyls av 1mm, occ to 4mm.								
						Alteration: Mod carbonatized. Weak-mod sericite-chlorite alt.								
						Structure: Mod-strongly cleaved 65°/LCA.								
						Sampling: 034243: 397-398m (for lithogeochemistry).								
						END OF HOLE								

971054

HOLE No. MM1a

FASMINCO EXPLORATION
DIAMOND DRILL CORE ASSAY DATA

PROJECT : MURCHISON MINE, TULLAH EL 22/90

SAMPLE						ASSAYS (ppm unless specified)																						COMMENTS
Number	Type	From m	To m	Interval m	Recovered m	Cu	Pb	Zn	Ag	Au	Ba / As	Sn / W	Rb / Sr	V / Nb	Y / Zr	Al_2O_3 / SiO_2 (%)	TiO_2 / Fe_2O_3 (%)	MnO / CaO (%)	K_2O / MgO (%)	P_2O_5 / Na_2O (%)	LOI / S (%)	
034230	Split NQ	96	98	2·0		78	40	128	<1	<0·008	510 / 11	7 / 7																Shale ± 3-5% po>>py
231	" "	146	148	2·0		67	22	99	<1	<0·008	476 / 10	8 / <5																" " " " "
232	" "	216	218	2·0		86	152	282	1	0·014	1203 / 64	6 / <5																Black shale ± 3-4% py, minor sp.
233	" "	235·5	236·7	1·2		11	137	217	<1	<0·008	1029 / 21	12 / <5																2% py, minor sp-gn in xyl sst.
234	" "	236·7	238	1·3		70	188	251	1	0·008	1184 / 330	9 / <5																Black shale ± 3-5% py
034235	" "	268	269	1·0		8	54	172	<1	<0·008	725 / 14	4 / <5																Sericitic siltstone, minor py
236	" "	269	270	1·0		6	86	63	<1	<0·008	600 / 4	4 / <5	105 / 167	10 / 11	30 / 182	10·61 / 74·3	0·23 / 2·52	0·08 / 3·95	2·45 / 0·63	0·035 / 0·93	4·24 / 0·147	Qtz-xyl sst. Minor py.
237	" "	270	271	1·0		9	18	90	<1	<0·008	931 / 4	9 / <5																Sericitic siltstone, minor py
238	" "	227	228	1·0									248 / 91	23 / 10	30 / 170	13·06 / 69·7	0·29 / 3·09	0·68 / 2·46	3·22 / 0·90	0·050 / 2·21	4·14 / 0·147	Xyl sst (Murchison Mine Host)
239	" "	305	306	1·0									131 / 90	<5 / 14	36 / 229	11·45 / 74·5	0·21 / 2·77	0·21 / 2·35	3·49 / 0·39	0·020 / 1·67	3·03 / 0·015	Fine xyl sst ± trace py, po, sp.
034240	" "	351·6	352·85	1·25		14	893	1517	2	<0·008	571 / 13	7 / 5																1-2% py, sp, po in tuff-shale
241	" "	336	337	1·0									173 / 132	61 / 11	27 / 237	14·24 / 62·0	0·45 / 4·68	0·22 / 4·89	4·00 / 1·22	0·102 / 1·63	6·38 / 0·024	Amygdaloidal dacite lava
242	" "	361·3	363·3	2·0		10	914	1142	2	<0·008	818 / 10	8 / <5	240 / 51	<5 / 13	33 / 129	13·65 / 71·7	0·15 / 1·92	0·18 / 1·95	4·87 / 0·92	0·021 / 0·89	3·41 / 0·314	Sericitic siltstone ± 1-2% py, sp
243	" "	397	398	1·0									190 / 59	<5 / 12	32 / 109	10·30 / 73·7	0·13 / 1·71	0·32 / 3·91	4·01 / 0·48	0·016 / 0·46	4·82 / 0·043	Sandy xyl-lithic epiclastic
Laboratory	ANALABS, COOEE			Analytical Method		AAS	AAS	AAS	AAS	FIRE ASSAY	XRF FA101	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	XRF XRF	
Job-No.	0235, 111310.60.09395	Date	27·4·93	Detection Limit (ppm)		2	3	2	1	0·008	10 / 1	3 / 5	5 / 5	5 / 3	5 / 5	0·05% / 0·1%	0·01% / 0·01%	0·01% / 0·01%	0·01% / 0·01%	0·005% / 0·05%	0·01% / 0·005%	

PASMINCO EXPLORATION
DIAMOND DRILL HOLE SUPPLEMENTARY DATA

PROJECT: MURCHISON MINE, TULLAH EL 22/90

HOLE No. MM1a

PETROLOGICAL SAMPLE RESULTS

SAMPLE NUMBER: 034246 MM1a 385.7m.

SUMMARY:

This is a formerly glassy, highly evolved quartz+ plagioclase-phyric rhyolitic lava that has suffered strong hydrothermal sericite alteration.

HAND SPECIMEN:

This is a mottled grey-green rather weakly cleaved felsic plagioclase+quartz-phyric lava with darker, much more cleaved bands, and quartz segregations up to several cm long.

THIN SECTION:

In the best preserved parts of this thin section, there are beautifully preserved perlitic cracks through devitified glass that indicate (together with less diagnostic criteria) that this was a glassy felsic lava. Albitized plagioclase phenocrysts are just slightly less abundant than quartz phenocrysts, each probably in the range 5-8 modal%. The plagioclase phenocrysts were mainly less than 2mm long, and are rather broken and disaggregated by the weak to moderate deformation that has affected this rock. Most are slightly speckled by very fine-grained sericite. Quartz phenocrysts are mainly less than 2mm across, many being resorbed and rather anhedral to slightly rounded. All are strained and fractured, and partially disaggregated, with subgrain recrystallization common along the fractures. This sample was so evolved that it contains no FeTi oxide phenocrysts, either fresh or altered. Nor were there any mafic silicate phenocrysts in this rock.

The groundmass, as noted above, was totally glassy, and shows excellent perlitic cracks in better preserved areas of the slide. Approaching more cleaved domains, the intensity of sericite development increases, building up to a very dense pervasive mesh throughout the groundmass in the strongly cleaved zones. In these zones, quartz phenocrysts are totally disaggregated and strung out into the cleavage. A few discontinuous bands of very ragged polycrystalline quartz with spotty calcite overprinting cut the rock, as well as a single thicker (to 3mm thick) vein of calcite.

This was an unusually evolved quartz+plagioclase-phyric rhyolitic glassy lava that has suffered strong sericitic hydrothermal alteration.

SAMPLE NUMBER: 034245 MM1a, 337.2m

SUMMARY:

This is a quite strongly hydrothermally altered (sericite-calcite), sparsely plagioclase-phyric dacitic to rhyodacitic lava or shallow dyke rock.

HAND SPECIMEN:

This is a dark green strongly altered felsic lava or tuff with a weak cleavage and a few stretched or flattened quartz or calcite-filled vesicles.

THIN SECTION:

This is a very strongly altered felsic volcanic rock, in which the combination of weak cleavage development and strong hydrothermal alteration have effectively obliterated the original mineralogy and texture. The rock consists of a rather heterogeneous quartzo-feldspathic 'background' that has been thoroughly pervaded by a dense mesh of sericite and fine calcite. Several deformed and albitized plagioclase phenocrysts are present but are stretched, rather disaggregated, and strongly overprinted by calcite and sericite, so as to be virtually indiscernible. Former FeTi oxide phenocrysts are totally altered to leucoxene, but have been dragged out and disaggregated, and small anhedral magnetite grains formed in this breakdown reaction form trails that sometimes stretch out into the cleavage. Apatite microphenocrysts and smaller crystals are not abundant, but are scattered through the groundmass, and small subhedral zircon crystals are also rather common.

The groundmass of this rock was almost certainly largely glassy. It presumably devitrified to a very fine-grained quartzo-feldspathic intergrowth that has coarsened, then been strongly overprinted by intense sericite-calcite alteration. Sericite forms a pervasive mesh throughout the rock, almost forming a cleavage. Calcite is also abundant, forming mainly small streaks and occasional larger lozenge-shaped crystal aggregates that may be deformed vesicles. Discontinuous streaks of chlorite are not uncommon, elongate in the direction of the sericite-defined 'cleavage'.

This sample was almost certainly a dacitic or rhyodacitic lava or shallow intrusive rock. To distinguish between these possibilities, the primary groundmass texture is critical. Unfortunately however, the strong alteration precludes an assessment of a volcanic versus intrusive origin. Many shallow intrusive felsic rocks in the Mount Read Volcanics have groundmass textures that suggest an originally largely glassy nature, so the apparently former glassy groundmass of this sample lends no diagnostic clues.

This was a sparsely plagioclase-phyric dacitic to rhyodacitic lava or shallow intrusive dyke rock that has suffered strong hydrothermal sericite-calcite alteration.

9301 96