ABMINCO N.L.
CLEVELAND MINE

CATEGORY: Surf Ex.

HOLE No.: C1285

GENERAL DATA

Objective: 500 NORTH HALLS FORMATION.

Area of Operation: W PROSPECT

Location: G4 ; Z500 Section

Collar R.L.: 488.26

Co-ordinates: [redacted] 16007.706 N, [redacted] 11683.601 E.

Bearing of Hole: 314° 37' 32" (312°) ~~(312°)~~

Angle of Hole: -52° 45' 46" (-53°)

Final Depth: 241.5m

Drilling Commenced: 26/4/78

Completed: 9/5/78

Logged by:

DRILLING DATA

Drilled by: LONGYEAR

Drilling Rig: 44

Driller(s): P. LEFTERUK, G. ABLETT

G. WINTERBOTTOM

Non Coring:

Coring:

Core Recovery:

HOLE SURVEYS

HOLE No.: 1285

IWPS 24164

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DIAMOND DRILL LOG

Hole No 1285 Page No 1

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein; c carbonate, q quartz

Mineralization : Trace 1 - 5%; Common 5 - 15%; Abundant 15 - 60%; Massive > 60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		NO CORE - TRI-CONE							
	6.00								
1.00		BASALT (Vb)							
2.70	10	From 6.00 to approximately 45.00 the basalt is extremely weathered to a orangy colour - Rare sections are fresh and these are a pale olive green colour. In the fresher parts chlorite veining is often seen and carbonate filled amygdules							
1.10									
1.53									
0.38		Core recovery is very poor with a majority of the core being							
0.72		fragmented and broken up.							
0.05		The Vb is oxidized & iron							
0.30	20	stains common on joints.							
0.40									
0.60		Brown shale unit 22.70 - 23.50.							
0.22		The core is broken up.							
0.25									
0.23									
0.95									
0.80		From 27.90 - 28.40 - clay zone & Vb and							
0.72		chocky shale fragments.							
1.38	30								
1.10									
0.30									
0.16									
0.57									
1.55									
1.52	40								
0.62									
0.43		Dark olive green massive Vb & fine chlorite filled amygdules. Minor chlorite alteration and veining.							
0.97									
1.43		- Vb -							
1.22	45								

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DIAMOND DRILL LOG

Hole Nº 1285 Page Nº 2

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1 - 5%; Common 5 15%; Abundant 15 60%; Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
1.45	46.80	Vb.							
0.52	47.50	TAN SHALE - Fine grained massive tan coloured shale - Bed'g. 45° to C.A.							
0.95	48.28	BASALT - F.g. weath. brownish to olive green in colour - lower contact not seen							
0.54	48.62	BROWN SHALE - Weathered f.g. shale							
0.38	49.00	BASALT - Porphyritic weathered Vb.							
0.40	49.70	TUFF SST - greenish well bedded tuff. - minor fine scale crossbed'g. Bed'g. 70° to C.A.					V	49.74	qtz vein 60° to C.A.
0.57	50	BROWN SHALE - broken up core consisting of mid brown siliceous shale. Lower contact faulted at 50.7 - qtz vein, open voids.		F					
1.00		PORPHYLITIC BASALT - Fine grained greeny grey massive Vb with abundant feldspar phenocrysts (?) - generally quite regular in size, at times rounded. Init'l 2 metres is a weathered brownish colour. Fractures are common, with alteration proximal to them.							
1.43									
1.01									
0.73									
0.97	55	Lower contact appears to be faulted - there is a rusty qtz vein and broken core below		F					
0.15	55.60	BROWN SHALE - Siliceous fine grained massive brown shale - Lower contact not seen							
0.55	56.35								
0.64		BASALT (Vb). Fine grained weathered olive green in colour massive Vb.							
0.60		Very fine scale chlorite filled amygdules. Fracturing common as are veins. The veins are filled with qtz, chlorite and iron oxides. No discernible major chloritic veining or alteration.							
1.59	60								
1.11		Breccia Zone - 60.40 - 60.58 - fracturing and open cavities associated with it. 55° to C.A.		Bx					
1.47		Lower contact not seen but could be faulted as the core is broken and there are open cavities with oxides, chlorite.							
1.65	63.54			?					
		PORPHYRITIC BASALT. Fine grained massive dark green porphyritic basalt. The phenocrysts (?) are regularly spaced and generally subedral to sub-rounded varying in size from 1mm to 0.5 cm. Epidote rich breccia between 64.13 - 64.28 45° to C.A. Bleaching above possibly associated with fault.		Bx					
2.94	65								
0.25		There is an irregular network of veins immediately below the Bx. Weathering and bleaching 66.54 - 68.10. Broken core around 67.80 FAULT (?) Qtz segregations around 69.60.							
2.22	RET 69.06								
	70								

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DIAMOND DRILL LOG

Hole No 1285 Page No 3.

Feature : Bedding, Foliation, Fragment - size & shape 0%, Shearing, Fault F, Vein c carbonate q quartz

Mineralization : Trace 1-5% Common 5-15% Abundant 15-60% Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
1.95		Bleaching and brx from 72.16 - 72.65 associated with 1cm qtz vein, some thick veins FAULT. at 72.36. Less porphyritic towards base of sequence - fine scale qtz/carbonate veining - chlorite filled amygdules.							
	73.62	FAULT - Brx, qtz vein.							
2.97	73.70	BASALT (Vb) Fine grained massive olive green Vb. Moderately chlorite veined and traversed by irregular calcite veins. Pale alteration associated with qtz vein at 74.50. Chlorite alteration at 75.80 - 76.00 associated with fractures and calcite veins. Intensely chloritized zone Brx between 77.49 - 77.59, 60° to C.A. Contact with sequence below chloritized and slightly fractured. 60° to C.A						74.50	7cm qtz, carb vein 45° to C.A.
	75							76.43	irregular qtz carb vein 40° to C.A.
2.98	77.37								
		PORPHYRITIC BASALT. Chloritic fine grained porphyritic Vb - phenocryst content decreasing to base with fine 20 cm long qtz veined and honey RX'ed carb.						78.67	qtz, carb vein 1cm wide 80° to C.A.
	79.42								
3.02	80	RED/BROWN SHALE - Massive reddish brown to grey brown shale, poorly bedded and fine grained. Lower contact 48° to C.A.							
	81.25								
1.56		BASALT (Vb) - generally fine grained massive, chloritic, with rare chlorite veins. Fine carbonate veining common. Occasional feldspar phenocrysts. Last metre is pale greyish blue green chloritized.							
	82.52								
0.95	85	ALTERED BASALT (Vb) Brownish green fine grained altered basalt - altn due to faults - Thin faults 84.90, 85.00, 85.05 Core Intensely broken 85.25 - 85.35 - gouge & qtz vein, open cavities.		TOTT					
	85.54								
2.59		BASALT (Vb) Fine grained olive green massive Vb - Rarely seen any chlorite veins. Generally erratic thin calcite veining - Possible minor faults at 86.94, 87.00, 87.72, 88.37 - usually 60° to C.A. Lower contact sharp with a step in it 45° to C.A.							
	89.07								
3.02		TUFFACEOUS SANDSTONE (Vt).							
	90	Massive medium grained greenish to reddy brownish tuffaceous sandstone with rare red shaly lithic fragments. Thin criss-crossing calcite veins are common, as are irregular qtz, carbonate segregations. Carbonate clots or spots are frequently seen. Minor fine grained red shale interbeds.						90.34	qtz vein 30° to C.A ± brecciated
3.03									
	PBT 94.25	From 95.68 the tuffaceous sandstone grades into a medium grained lithic sandstone, with red shale fragments.							
	95								

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DIAMOND DRILL LOG

Hole No 1286 Page No 4

Feature: Bedding · Foliation · Fragment-size & shape · Shearing · Fault · Vein (c carbonate, q quartz)

Mineralization: Trace 1-5% · Common 5-15% · Abundant 15-60% · Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
2.97	96.20	becoming more frequent towards the base of the unit. Lower contact 40° to C.A. but slightly irregular.			
	97.36	LITHIC TUFFS (Vt) – Coarse grained lithic tuff grading into a medium grained " tuff with f.g. tuff shales. Lower contact 45° to C.A.			
3.02 / 3.04 / 3.01 / 3.02 / 3.06 / 2.99	100 / 110 / 115	BASALT (Vb) Fine grained massive olive green basic volcanic. Quite homogeneous in character. Chlorite patches or segregations are common and appear to be evenly spaced. Rare massive clots of chlorite. Fine scale calcite veining, generally quite erratic is usually seen. Several veins are elongate and parallel to the C.A. and at times forming discontinuous segregations. Fine carbonate spotting usually seen around carbonate veins (secondary X'ls). Epidote associated ē qtz vein 25° to C.A at 114.71. From 112.75 to base of sequence the Vb is almost devoid of chlorite, rare clots, chlorite filled amygdules. Minor calcite veining – appears to become siliceous towards base. Lower contact 60° to CA.	F(?)	V 98.27 V 110.15 V 111.71 114.98	0.5cm qtz, carb vein 30° to C.A. Qtz vein ē slickensides Fault (?) 25° to C.A. qtz, epido vein 25° to C.A.
	115.70	LITHIC TUFF (Vt) – Mainly m.g. lithic tuffs ē lesser interbedded tuff shales, 70° to CA			
2.45	117.40	TUFFACEOUS SHALE (Vt) Fine grained moderately well bedded tuff greenish brown to redy brown in colour. Bed'g 45° to C.A. Lower contact gradational with tuffs becoming sandier			
	118.63	TUFFACEOUS SANDSTONE (Vt) Medium grained reddish brownish green tuff sst. with minor criss cross carb. veinlets – Lower contact possibly FAULT	F		Qtz, chlorite vein ē slickensides.
2.99	119.24	LITHIC / TUFF SHALE – Fine grained tuff shale and lithic tuff – Lower contact 60° to C.A.			
	119.74	BASALT (Vb) – Fine grained massive Vb. Contact 65° to CA			
	120	TUFFACEOUS SHALE – minor lithic tuff			
3.09 / 2.91	120.28 / 125	BASALT (Vb) – The initial 1.47 metres are foliated and altered, epidote and chlorite rich – a result of faults at 120.94 2 cm wide, 45° to C.A, 121.19 – 3 cm wide 45° to C.A. Bx between 122.30 – 122.40. Large chlorite clots 123.00 – 123.45. Fractured, calcite veined and chlorite veined Vb from 123.45 – 126.25 Qtz segregations are common	F F Bx Cl		qtz chl vein epidote.

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DIAMOND DRILL LOG

Hole No 1286 Page No 5

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
3.48	130	Possible fault at 126.25 (slickensides) 60° to C.A. From 126.30 to 134.60 the Vb is fine grained olive green and very homogeneous. Minor calcite veining and rare chlorite developed. Minute chlorite filled amygdules common. 134.60 – 134.77 – 3cm qtz vein with chlorite followed by several thin qtz, carbonate veins, Vb is chloritized and altered – maybe healed FAULT (?).							
3.11		The Vb from 134.77 to the base of is characterized by thin tension cracks and abundant irregular chlorite dots and veins. Lower contact is sharp. 45° to C.A.							
3.07	135			F(?)					
1.80	137.17	BROWN SHALE – F.g. massive poorly bedded shale – thin tension cracks.							
	137.84	BRECCIA = FRAGMENTED SHALE + Vb							
1.25	139.00	BASALT (Vb) Fine grained massive Vb olive green in colour, 2 fine scale calcite veining common chlorite – qtz, cbt vein at 139.02. Lower contact 45° to C.A						137.62	
3.14	140	TUFF SHALES – (VE) Well bedded tuffs brownish in colour grading to chaotic fractured and chloritized green tuffs. Bed'g. 45° to C.A. Lower contact sharp 60° to C.A							
	141.8	CHOC = PURPLE BROWN SHALES (VE) Massive f.g. erodic poorly bedded shales with common chlorite veining. 45° to C.A							
3.12		TUFF SST (VE) – medium grained brownish red tuff sst. with minor f.g. well bedded tuff shales, bed'g. 47° to C.A.						144.70	
2.87	145	PURPLY BROWN TUFF SHALE (VE) – fine grained purplish to reddy brown well (55°) bedded tuffs. Patches of re'X'ed carbonate are common at times having a radiating structure. Fine scale calcite veining common. Lower contact gradational, core broken at contact.							
	147.55	CHOC SHALES – Massive, weakly foliated choc coloured fine grained shales. Irregular green patchy altered areas. Rare fine calcite veining. FAULT – slickensides, qtz, cbt veins 148.23, 4cm wide 80° to C.A. – Contact irregular.			F				
3.07	150	PURPLE BROWN SHALES –						149.85	

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DIAMOND DRILL LOG

Hole No 1285 Page No 6

Feature : Bedding, Foliation, Fragment - size & shape 0% ; Shearing, Fault F, Vein c carbonate q quartz

Mineralization : Trace 1-5% ; Common 5-15% ; Abundant 15-60% ; Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	150.60	Weakly foliated and slightly altered shales Lower contact 70° to c.A.							
1.02		CHOC SHALES. Fine grained massive poorly bedded choc coloured shales, abundant fine scale erratic calcite veining 0.25 in purple brownish shale unit - Rare irregular patchy chloritic alteration. Lower contact 65° to c.A.							
1.11	153.28	CHOC SHALES / TUFF SST / LITHIC TUFF / PURPLE BROWN SHALE. Interbedded sequence of f.g. massive choc. shales, medium grained greenish brown tuff sst, lithic tuffs with fragments to 0.5 cm Minor purply brown f.g. shales. Bedding is generally seen between units, usually 45°-30° to c.A. Lower contact sharp 40° to c.A.							
3.01	155								
	157.59								
3.02		BASALT (Vb). Fine grained dark olive green massive Vb. Very fine carbonate spotting common. Occasional calcite veins. Thin chlorite veining rare becoming more common towards the base. Appears to be a slightly br'ed lower contact		c			V	160.00	1 cm, long vein 15° to c.A containing qtz, carbonate.
range of de.	160								
	161.60								
3.05		PORPHYRITIC BASALT Fine grained grey green to olive green massive highly porphyritic (?) - feldspars - basic volcanic. The phenocrysts are quite regular in size, generally 2 mm. Rare fine amygdules filled with chlorite. Carbonate segregation, irregular veins and veinlets are very common with secondary carbonate associated with them. The feldspars have a stunned colouration to them occasionally Chlorite veining rarely seen. Qtz, carb, Vb Bx, 4cm wide at 165.07 followed by 1 cm qtz vein 45° to c.A. Fine carbonate spotting adjacent to some veins. Epidote associated with veins in lower half of sequence Bx(?). 168.70 - 168.80, 171.92 - 171.98 The Vb becomes less porphyritic towards the base of the unit from 181.70 Lower contact sharp 30° to c.A		c	Bx		V	165.20	qtz vein 45° to c.A.
2.99				c			V	166.23	qtz, carb vein 25° to c.A.
	170				Bx		V	167.30	qtz, carb vein 20° to c.A.
2.96							V	171.35	qtz, carb, epidote vein 45° to c.A.
					Bx		V	171.70	Irregular qtz vein minor carb 25° to c.A close to breccia.
2.97							V	174.35	Epidote & minor qtz, carb.
3.03									
range Scale. 3.04	180					F(?)	V	181.05	10cm qtz, chl, carb vein may be FAULT (?). 45° to c.A.
3.02	183.00								
		CHOC. SHALE. Massive poorly bedded fine grained choc. coloured shale Very fine calcite veins - rare - Thin fault at 183.04, 35° to c.A. Contact 42° to c.A				F			
	184.46								
	185.	TUFFACEOUS SANDSTONE. Medium grained				Bx			

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DIAMOND DRILL LOG

Hole No 1285 Page No 7

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault (F), Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
3.00	185.70	carbonate rich brownish grey tuff sst. 15% at 184.91, 6 cm wide - Contact 40° to C.A							
2.34	190	CHLOC. SHALES Generally massive weakly layered fine grained chlor. coloured shale. Rare thin calcite veins - minor green altered interbeds. Initial 30 cm characterized by abundant recr'd secondary carbonate. Patchy green altered shales towards base of sequence. Lower contact gradational.		C				190.10	
2.04	192.76	CHLOC SHALE / GREEN TUFF SHALE - interbedded chlor coloured shales and erratic green tuffs.							
		DOLOMITIC TUFF SHALE - fine green tuff & irregular carbonate (lst) blebs.							
1.58	191.29	CHLOC SHALES Massive fine grained generally erratic to poorly bedded chlor. coloured shales. - calcite veining and secondary X's common Irregular blebby and patchy green alteration zones common. From 196.20 to base of sequence the shales become a darker greeny brown and are grey green at contact with underlying unit. Lower contact sharp 45° to C.A. slickensides possible FAULT							
2.85	195								
	196.85			F					
3.05		GREY / GREY BROWN SHALE - DOLOMITIC. Disrupted sequence of fine grained slumped greyish green to grey brown shales with medium grained dolomitic shales. Final 1 m is mainly dolomitic shales, generally chaotic. Recr'd carbonate at base. Contact sharp 80° to C.A.							
	199.75								
2.91	200	GREY BROWN SHALE Massive fine grained, chaotic grey brown shale with very minor calcite veining. Lower contact irregular and possibly silicified & Bx'ED.							
	202.66							202.37	Calcite vein 30° to C.A & Galena, Po sph, chpy.
3.12	RET 202.14 202.63	LIMESTONE. Chaotic fragmented limestone with minor grey black shale interbeds. Fragments are subrounded to rounded and generally fractured by calcite veins. Beds vary from 1cm to 2 cm in width. Lower contact not well defined.							
	203.86								
2.05		GREY SHALE Fine grained erratic poorly bedded med grey coloured shale. Thin fractures filled ? calcite. Lower contact sharp. 45° to C.A.		C					Minor fine grained py crystallized in patches.
	205.91								
	205.20 & 205.60 RET	LIMESTONE. Massive black fine grained limestone, generally well bedded Bed'g. 35° to C.A.							
3.00	206.80	Lower contact core broken, slickensides FAULT		F					
0.82		CHERT Fine grained very hard mid grey generally well bedded chert. Bedding varies from 11 to core axis to 25° to C.A Minute tension cracks are common, more so in the less well bedded sections.							
2.09	210								

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DIAMOND DRILL LOG

Hole No 1285 Page No 8

Feature: Bedding, Foliation, Fragment-size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization: Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG / TRACE / COMMON / ABUNDANT / MASSIVE	DEPTH m	MINERALIZATION
		The lower metre is generally fractured up with fine scale tension cracks. Although bedding is still preserved.			
2.81	211.95	FAULT - healed, shale qtz, chert breccia.	Bx		
	212.20	CHERT / SHALE / SST - Siliceous erratic.			
	212.55	BROWN SHALE. - siliceous fine grained.			
0.52		CHERT - fine grained massive and fractured greyish green chert. Lower contact faulted (slickensides 20° to C.A	F		
1.75	213.95	SHALE / CHERT / SST / CHERT - f.g. greenish shale c fractured shale, carbonate rich sandstone. Lower contact gradational			
1.78	215	BROWN / GREY SHALE Massive chaotic brownish to grey poorly bedded shale. BX 215.35 - 215.45 - silicified. From 217.07 to 217.40 the shales are grey with carbonate rich sst(?) clasts. Lower contact faulted (slickensides) 60°	Bx, F		
3.01	217.40	SANDSTONE (sst) Medium to coarse grained grey to mid grey massive poorly bedded sst. It is carbonate rich and occasionally veined by calcite. Lower contact sharp 50° to C.A.			Minute chips galena detected in thin calcite vein.
3.0	220 / 220.37	GREY SHALE - Fine grained chaotic poorly bedded grey shale - rare calcite veins. Lower contact not seen.			
	221.70	SANDSTONE - Medium to coarse grained mid grey massive sst. Carbonate rich with usual carbonate clots and minor calcite veining. Lower contact sharp 60° to C.A.			
2.5	224.12 / 225	SHALE / SANDSTONE - Grey chaotic shale with carbonate rich sandstone interbeds. Lower contact not seen.			
	225.60	GREY BROWN SHALE - Fine grained chaotic reddy purple brown shale with minor calcite veins.			
3.1	227.	CHAOTIC LIMESTONE / SHALE - fragmented veined			
	227.40	SANDSTONE / SHALE - M.g. carbonate rich sst and f.g. chaotic shale, FAULT, slick's 228 Lower contact. 65° to C.A.	F		
	228.32	GREY BROWN SHALE Massive f.g. erratic greyish brown shale - Lower contact 30° to C.A			
	229.13	SANDSTONE - Carbonate rich m.g.			
	229.43 / 230	GREY BROWN SHALE - F.g. siliceous shale c 15cm chert band at 229.77. Lower contact 65°			
3.05	230.03	SANDSTONE - m.g. carbonate rich.		230.33	
		LIMESTONE - fractured, chaotic.			
	230.55	GREY BROWN SHALE Massive fine grained poorly bedded erratic brownish grey shale. Rare thin carbonate veins. Lower contact not seen.			
2.31	232.87	SANDSTONE / SHALE - m.g. sst c siliceous grey shale - possible fault, qtz vein, 60°	F(?)		
	233.42	SANDSTONE m.g. mid grey carbonate rich			
		SANDSTONE, CHERT, CALCITE VEINED BX - Slickensides	Bx		Galena in calcite vein.
1.10	235	CHERT. Fine grained massive to			

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DIAMOND DRILL LOG

Hole No 1285 Page No 9.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1 - 5%; Common 5 15%; Abundant 15 60%; Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
2.47		well bedded whitish grey to black. Bed's usually varies between 25° - 60° to c.A. Fine scale fracturing very common. Very minor calcite veining. At times the chert is very irregular.							
0.75		Lower contact not seen. ~~EPIDOTIC SKARN = boom.~~							
0.17									
1.95	240	SANDSTONE (SST) - medium grained mid grey massive sst. carbonate rich. Rare thin calcite vein.							