

MINTO GEOLOGICAL LOGS

EXPLANATORY NOTES -- ABBREVIATIONS

ROCK TYPES

And - Andesite
AG = MG = Altered Granodiorite = Minto Granodiorite
Apl - Aplite
B - Basalt
BGd, BGr, BG, BGn, BGG - Biotite Granodiorite - Biotite Grandiorite
Gneiss, etc.
C - Conglomerate
D - Diorite
FKPG - Foliated Orthoclas Porphyry Granodiorite
G - Granodiorite
Gn - Gneiss
Gr - Granite
H - Hornfels
KPG - Orthoclase Porphyry Granodiorite
MG = AG = Altered Granodiorite = Minto Granodiorite
Peg - Pegmatite
QD - Quartz Diorite
QM - Quartz Monzonite
RTG - Red - Tan - Granite
WBGD - White Biotite Granodiorite

MINERALS

B - Biotite
Cc - Chalcocite
Chl - Chlorite
Cov - Covellite
Cpy - Chalcopyrite
Ep - Epidote
Fl - Fluorite
Fs - Feldspar
Gyp - Gypsum
Hem & Hm - Hematite
K Feldspar - Potassium feldspar
Lim - Limonite
Niod - Niodocite
Ofs - Orthoclase feldspar
Ortho - Orthoclase
Q.- Quartz
Spec - Specularite

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STRUCTURES - TEXTURES

Bx - Freccia
Dik - Dike
F - Foliated
FD - Fracture Density
Fg - Fine grained
Flt - Fault
Frc - Fractured
Gge - Gouge
Lc - Lower contact
My - Mylonite
P - Porphyry
PH - Pyrito hedron
Pheno - Phenocryst
Shr - Shear
slk - Slickenside
Stk - Stockwork
Uc - Upper contact
Vfg - Very fine grained
Vlt - Veinlet
Vn - Vein
WF - weakly foliated
Xtals - Crystals

MISCELLANEOUS

A - Altered
C.A. - Core Axis
CC & C - Constant Composition & Texture
L - Length

// - Parallel
↑ - Up to
> - Greater than

ASARCO - DDH LOG

MINTO PROJECT

NOTE 1: Number denotes relative abundance 10:1:5

NOTE 2: % by volume
* Specularite

NOTE 3: P - Pervasive
L - Localized strength
Tr - Trace
W - Weak
M - Moderate
S - Strong
Ex. P-S - Pervasive - Strong

NOTE 4: Key for rock type
4 letters max.

NOTE 5: UC - Contact (Upper)
LC - Contact (Lower)
Dik - Dike
Flt - Fault
Frc - Fracture
Gge - Gouge
Shr - Shear
Stk - Stockwork
Vn - Vein
Vit - Veinlet

NOTE 6: Type
W - Weak
M - Moderate
I - Intense
G - Gneissic

HOLE No. 84 Page 1 of 1
Lat. 10,989.7 Dep. 9,455.2
Ele. 2,758.2 T.D. 377 Dip 90°
Bearing _____ Date 5/23/74 Fin. 5/24/74

Logged by J.R. Petura

FROM	TO	SAMPLE NO.	(1) ECONOMIC MINERALS					(2) Fe MINERALS				(3) ALTERATION								(4) ROCK TYPE	ROCK COMPOSITION						(5) STRUCTURE			FOLIATION		REMARKS					
			Cpy	Born	Mal	Sph	Gal	Mo	Py	Mag	Hm	Lim	Ox	Orth	Qtz	Ser	Biot	Chl	Ep		Carb	Anhy	Clay	Orth	Plag	Qtz	Pyx	Biot	Hbl	Type	Depth		to CA	Degree	CA		
0	41																																				Overburden
41	159																																			Ortho Phenocrysts	
159	186																																				
186	196	046																																			
196	206	047	1		15																															Stain 208.5'	
206	216	048	3	1	.3					1																									85 Bornite - appears with cpy, alone & with Py. In one instance, bornite surrounded by cpy. Concentration of mineralization occur at late stage veins, e.g., 214 & 210, Py seems to decrease from top to bottom of 10'.		
216	226	049	14	1																																	
226	236	050	1																																	*Stain 228, Cpy associated with biotite.	
236	246	051	10		3																																
246	256	052	15	1	13																																
256	266	053	1		2																																
266	276	054	15	1																																	High grade ~ 1% Cu 265-270.
276	286	055	15	1																																Ortho phenocrysts	
286	296	056	1																																		
296	377																																				*Stains at 352 + 336 + 326

ASARCO - DDH LOG

MINTO PROJECT

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QD: Quartz Diorite

NOTE 5: UC-Contact (Upper)
LC-Contact (Lower)
Dik-Dike
Flt-Fault
Frc-Fracture
Gge-Gouge
Shr-Shear

Stk-Stockwork
Vn-Vein
Vlt-Veinlet

NOTE 6: Type
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G - Gneissic

HOLE No. 118 Page 1 of 3

Lat. 8,597.2 Dep. 9,665.0

Elev. 2,932.8 T.D. 732 Dip 90°

Logged by J.R. Petura

Bearing _____ Date S.12/7/74 Fin.14/7/74

FROM	TO	SAMPLE No.	(1) ECONOMIC MINERALS						(2) Fe MINERALS				(3) ALTERATION								(4) ROCK TYPE	ROCK COMPOSITION						(5) STRUCTURE			FOLIATION		REMARKS					
			Cpy	Born	Mal	Sph	Gal	Mo	Py	Mag	Hm	Lim	Ox	Orth	Qtz	Ser	Biot	Chl	Ep	Carb		Anhy	Clay	Orth	Plag	Qtz	Pyx	Biot	Hbl	Type	Depth	to CA		Degree	CA			
0	9																																				Overburden	
9	19	927			1							TR	2	SP	ML											G	10	61	10		16	FRC	17	50	MVL	40	FD = 3 Bio conc and localized foliation 10-12' with malachite	
19	84											TR	1	WP	SL											G	12	57	14		15	FRC	67	60			FD = 3, 36-46 strong ortho altn, more Qtz rich at top/ stain 28'	
84	94	928													WL											CD	3	63	20		13	FRC	85	70			FD = 2, 7 stains, stain 85 = diorite	
94	97	929	5	1											WL											G	13	63	7		16	FRC	95	70	5	65	FD = 1, stain 95, 80% Cu with bio	
97	104	930													WL											QG	6	49	33		11	FRC	103	40			FD = 2 stain 99	
104	109	931													WL											OD	3	67	19		10	FRC	107	15			FD = 1 stain 108	
109	119	932	1							4					SL											G	14	48	10		14	FRC	114	45	MVL	60	FD = 2, chlorite accumulation for 5" around 1/2	
119	137														WL											G	7	68	13		11	FRC	131	40			FD = 2, stain 128	
137	147	933	1							6					SP											G	20	56	10		10	FRC	144				FD = 2, stain 151, tends towards banding = slightly contorted.	
147	157	934	1							5					ML											G	20	51	11		12	FRC	152	70	SL	55	FD = 1, localized bio concn.	
157	167	935	1							3					WL											G	12	61	11		12	FRC	165	40			FD = 2, stain 168; had <2% ortho.	
167	177	936	1							2																G	7	65	17		10	FRC	175	40	WL	55	FD = 2, Qtz vein 181 (6'), Mo appears to be assoc with Qtz.	
177	187	937	1					1	2						WL											G	7	65	17		10	FRC	184	20			FD = 2, fairly homogeneous	
187	210														WL											CD	5	64	18		12	FRC	202	50			FD = 2, rock composition, Av between QD & altered zones; more 2 x 2 veins (stain 217)	
210	220	938	10	1				1	2						ML											G	12	55	17		13	FRC	213	15			FD = 2; 80% of 222-223 Plag and Ortho pegmatite.	
220	225	939																								OD	5	64	18		12	FRC	222	0 to 10			FD = 2, 2 ortho phenocrysts at 225.4.	
225	235	940	1																							G	8	68	12		12	FRC	226.5	40			FD = 3, stain 238, Qtz vein 244.7-245 carries cpy, plag altd white	
235	245	941	1																							G	9	65	12		12	FRC	240	30	ML	60	FD = 2; plag is white	
245	255	942	1																								FG	9	65	12		12	FRC	249	50	M	60	FD = 2, plag is white
255	265	943	1																								G	11	60	12		15	Peg Dik	258.5-59.8	15	WL	35	FD = 2, plag is white
265	275	945	1																								FG	14	62	11		12	FRC	273.5	30	MS	55	FD = 2, plag is white, garnet crystals
275	285	946	1																								FG	22	55	11		11	FRC	279	40	M	45	FD = 3, plag is white, stain 278', garnet crystals.
285	295	947	20	1																							FG	20	56	11		12	FRC	293	0	M	40	FD = 4, plag is white
295	305	948	1																								FG	20	54	13		12	FRC	300	20	WM	50	FD = 2, plag is white, Mo assoc with Qtz conc.

#944 destroyed put in same bag as #943

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Ex.P-S - Pervasive - Strong

NOTE 4: Key for rock type
4 letters max.
CG: Has 7/15% Q

ASARCO - DDH LOG

MINTO PROJECT

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Dik-Dike
Fit-Fault
Frc-Fracture
Gge-Gouge
Shr-Shear

Stk-Stockwork
Vn-Vein
Vit-Veinlet

NOTE 6: Type
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HOLE No. 118 Page 2 of 3

Lat. 8,597.2 Dep. 9,665.0

Elev. 2,932.8 T.D. 732 Dip 90°

Logged by J.R. Petura

Bearing _____ Date 12/7/74 Fin. 14/7/74

FROM	TO	SAMPLE No.	(1) ECONOMIC MINERALS					(2) Fe MINERALS					(3) ALTERATION										(4) ROCK TYPE	ROCK COMPOSITION						(5) STRUCTURE			FOLIATION		REMARKS	
			Cpy	Born	Sph	Mo	Py	Mag	Hm	Lim	Ox	Orth	Qtz	Ser	Biot	Chl	Ep	Carb	Anhy	Clay	Orth	Plag		Qtz	Pyx	Biot	Hbl	Type	Depth	to CA	Degree	CA				
305	315	949	12	1		.5							TR												FG	20	49	15		15	FRC	313	85&40	MSL	50	FD = 4, plag is white
315	321	950	11	1																					FOM	33	38	16		12	FRC	318	Follow Foliation	MS	45	FD=2-3; stain 315, tends greatly towards gneissic, Bo after Cpy
321	325	951																							G	10	59	16		12	FRC	322	0-2			FD = 2, bio conc 320.4 - 321.0
325	393														1										KPG	8	60	16		15	Dik Peg P-O-O	381-384	45			FD = 2, stains 328 and 368
393	403	952	1																						G	13	60	11		15	FRC	401	25&15			FD = 3, a few blebs of cpy along contact of very coarse gr to mod gr Granod 398
403	428																								KPG	8	60	16		15	FRC	416	20			FD = 2
428	438	953	9		1		TR				1														KPG	8	65	10		15	Dik F.Gr Pl & Bio	433-33.5	55			FD = 3 - calcite localized in frac; cpy and native well dispersed
438	448	954	1								2														KPG	8	58	18		13	FRC	442	0	MWL	80	FD = 3, foliated zone 438.5-439
448	467																								G	7	59	17		16	Vn Peg O-O-B	463(3")	40			FD = 1, appears to have very little hematite staining
467	477	955													1										G	7	61	16		15	FRC	473	70			FD = 2, 3, few large books of bio (472') FD = 2, 3, foliated, 2' peg 480-82; peg comp P58,0-18,B13,P10, stain 478,480
477	482	956	8	1			TR																		FG	16	56	11		16	FRC	477.4	30	ML	75	FD = 1, stain 488'.
482	492	957																							D	6	71	8		14	FRC	484	60			FD = 3, Py and Cpy well dispersed; plag = white
492	502	958	1					2																	OM	38	36	12		11	FRC	494	25&10			FD = 3, some mineral accumulation, plag is white FD = 2, some vugs at 517; plag = white; some mineral accumulations,
502	512	959	1					1																	CM	32	44	14		15	FRC	508	0&54			Stain 518
512	522	960	1					1			TR														CPG	12	46	31		10	FRC	518	25			FD 2-3, most of ortho appears to be secondary, plag is white
522	532	961	1					TR			1														QG	10	60	17		12	FRC	528	45			FD = 2-3, 535-36, highly altd vuggy zone with Cpy and Py, rest of rock rel. barren, stain 535.
532	542	962	1					1																	QG	10	60	17		12	FRC	539	40			FD = 2, most orthoclase is secondary, py in with 3" bio conc at 554.
542	559							TR							1	SL									QG	8	56	19		16	FRC	554	50			FD = 3, 3 times (up to 6") bio conc & foliated with Cpy and py.
559	569	963	1					1			1														CG	8	57	18		16	FRC	564	65	SUL	65	FD = 3-4; stain 582
569	587														1										QG	7	56	27		9	FRC	579	70&10			FD = 5, Mag conc with localized plag conc at 592.5.
587	597	964	1						1																CG	8	60	17		13	FRC	593	65	WVL	80	FD = 5; most of Cpy assoc with Bio
597	607	965	1					TR	1																FG	14	60	10		14	FRC	602	75	M	55	FD = 4, Stain 616, clost to diorite
607	617	966	1						TR																FG	13	60	10		16	FRC	611	55	W	45-0	FD = 3; 2 smaller similar dikes to 626'; cpy Cl is culminated and open space filling 625
617	627	967	1					TR	TR																FG	13	60	10		16	Dik F.Gr P.C.O.	625.8 626.6	50	W	40	
627	637	968	10	1					2																FG	16	54	13		14	FRC		Follow Foliation	M	60	FD = 2.5, stain 633, 627-29 somewhat contorted, mag 628 augen like, few garnet crystals

PROJECT MINTO						HOLE NO. 118-74 (1 of 2)							
OVERBURDEN 10'			TOTAL DEPTH 732'			EASTINGS 9,665.0			NORTHINGS 8,597.2			ELEVATION 2932.8	
SAMPLE NO.	FROM	TO	INTER	TOTAL COPPER	NON SULPHIDE COPPER	Oz Ag	Oz Au				CORE RECOVERY %	SPECIFIC GRAVITY	REMARKS
0927	9	19	10	0.01		< 0.01	< 0.003						
0928	84	94	10	< 0.01		< 0.01	< 0.003						
0929	94	97	3	1.40		0.19	0.003						
0930	97	104	7	< 0.01		< 0.01	< 0.003						
0931	104	109	5	< 0.01		< 0.01	< 0.003						
0932	109	119	10	0.21		0.04	< 0.003						
0933	137	147	10	0.34		0.04	< 0.003						
0934	147	157	10	0.29		0.05	< 0.003						
0935	157	167	10	0.16		0.04	< 0.003						
0936	167	177	10	0.02		0.03	< 0.003						
0937	177	187	10	0.13		0.03	< 0.003						
0938	210	220	10	0.30		0.07	< 0.003						
0939	220	225	5	0.01		< 0.01	< 0.003						
0940	225	235	10	< 0.01		0.01	< 0.003						
0941	235	245	10	0.44		0.06	< 0.003						
0942	245	255	10	0.38		0.06	< 0.003						
0943	255	265	10	0.41		0.04	< 0.003						
0944	Tag destroyed												
0945	265	275	10	0.36		0.03	< 0.003						
0946	275	285	10	0.34		0.01	< 0.003						
0947	285	295	10	0.48		0.03	< 0.003						
0948	295	305	10	0.46		0.04	< 0.003						
0949	305	315	10	0.34		0.01	< 0.003						
0950	315	321	6	0.31		0.04	< 0.003						

PROJECT MINTO						HOLE NO. 118-74 (2 of 2)						
OVERBURDEN 10'		TOTAL DEPTH 732'				EASTINGS 9,665.0		NORTHINGS 8,597.2		ELEVATION 2932.8		
SAMPLE NO.	FROM	TO	INTER	TOTAL COPPER	NON SULPHIDE COPPER	Oz Ag	Oz Au			CORE RECOVERY %	SPECIFIC GRAVITY	REMARKS
0951	321	325	4	<0.01		<0.01	<0.003					
0952	393	403	10	0.02		<0.01	<0.003					
0953	428	438	10	0.02		<0.01	<0.003					
0954	438	448	10	<0.01		<0.01	<0.003					
0955	467	477	10	<0.01		<0.01	<0.003					
0956	477	482	5	0.17		0.03	<0.003					
0957	482	492	10	0.60		0.04	<0.003					
0958	492	502	10	0.70		0.09	<0.003					
0959	502	512	10	0.43		0.06	<0.003					
0960	512	522	10	0.01		<0.01	<0.003					
0961	522	532	10	0.02		<0.01	<0.003					
0962	532	542	10	0.04		<0.01	<0.003					
0963	559	569	10	0.04		<0.01	<0.003					
0964	587	597	10	0.07		0.01	0.003					
0965	597	607	10	0.96		0.11	0.008					
0966	607	617	10	0.95		0.11	0.004					
0967	617	627	10	0.50		0.07	0.004					
0968	627	637	10	0.68		0.10	0.005					
0969	637	645	8	0.55		0.07	0.006					
0970	645	647	2	0.02		<0.01	<0.003					

OVERBURDEN 26'

TOTAL DEPTH 988'

EASTINGS 11,105.7

NORTHINGS 8,646.1

ELEVATION 2847.6

SAMPLE NO.	FROM	TO	INTER	TOTAL COPPER	NON SULPHIDE COPPER	Oz Ag	Oz Au					CORE RECOVERY %	SPECIFIC GRAVITY	REMARKS
1198	229	246	17.0	0.07		< 0.01	< 0.003							
1199	275	280	5.0	0.29		< 0.01	< 0.003							
1200	280	290	10.0	0.03		< 0.01	< 0.003							
1201	290	300	10.0	0.01		< 0.01	< 0.003							
1202	300	310	10.0	< 0.01		< 0.01	< 0.003							
1203	310	320	10.0	0.01		< 0.01	< 0.003							
1204	320	330	10.0	0.01		< 0.01	< 0.003							
1205	330	340	10.0	0.08		< 0.01	< 0.003							
1206	340	350	10.0	0.05		< 0.01	< 0.003							
1207	350	360	10.0	0.01		< 0.01	< 0.003							
1208	398	408	10.0	0.10		< 0.01	< 0.003							
1209	408	418	10.0	0.01		< 0.01	< 0.003							
1210	418	428	10.0	0.02		< 0.01	< 0.003							
1211	428	438	10.0	0.07		< 0.01	< 0.003							
1212	438	448	10.0	0.23		< 0.01	< 0.003							
1213	448	458	10.0	0.07		< 0.01	< 0.003							
1214	525	535	10.0	0.06		< 0.01	< 0.003							
1215	553	563	10.0	0.10		< 0.01	< 0.003							
1216	563	573	10.0	0.01		< 0.01	< 0.003							
1217	573	583	10.0	< 0.01		< 0.01	< 0.003							
1218	583	593	10.0	0.16		0.01	< 0.003							
1219	593	603	10.0	0.25		0.03	< 0.003							
1220	603	613	10.0	0.03		0.01	< 0.003							

