CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
520-770-3500
http://www.azgs.az.gov
inquiries@azgs.az.gov

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Form SL-1035

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File No. Aa-16A.22.15

Subject: LAKESHORE GEOLOGY, Pinal County, Arizona

J.H.C.

JAN 13 1969

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 13, 1969

TO: J.H. Courtright

FROM: J.E. Kinnison

Lakeshore breccia on
N.W. edge of the area
drilled to this date

Five drill holes (P-63, P-73, P-74, P-77 and P-79) have penetrated a thick section of pre-ore breccia; possibly a breccia pipe. Fragments are dominantly quartzite with a lesser amount of andesitic rock, and subordinate porphyry fragments. Also present are fragments extensively altered to biotite aggregates---possibly representing pre-Cambrian Apache diabase. While evidence to establish a breccia pipe origin in preference to a fault breccia is not absolutely conclusive from these drill cores, three factors strongly suggest a breccia pipe:

1) The holes show a large areal and vertical extent.

2) Some of the fragments are rounded---a characteristic of breccia pipes---and yet do not show mylonite or shear structure as would be expected from a fault where rounded "pebbles" are produced.

3) Sulphides show evidence of open space filling (in part) between the fragments---a characteristic more prevalent in loose breccia pipes, and less in the commonly tight breccia of a fault zone.

P-74 shows the thickest section, extending 1252 feet, from 984' to 2236 plus ft. (end of my logging). Andesite is present throughout, but is silicified and blurred with the quartzite (Troy quartzite?). The oxidized zone is flooded with hematite to such an extent that the pre-ore age is questionable. The sulphide zone, however, clearly shows hypogene pyrite and chalcopyrite filling spaces between fragments and also veinlets cutting across the breccia fabric. The fragments, also, are mineralized. Strong chalcocite in the breccia.

P-63. From B.R. at 1600, to 2500. Bx with fragments of andesite and Silver Bell andesite. Texture similar to P-74. Quartzite is minimal. Penetrated Troy Quartzite (?) at 2500 ±, Mescal Ls. @2528, and upper dripping Spring quartzite (?) @2539 to 2682. Below this penetrated andesite, arkosic quartzite, and andesite-cgl or Bx to 2794 T.D. This last interval of andesitic rocks shows "ribbon-rock type" of blurred boundaries and textures---may be a pipe offshoot from the principal breccia. Some chalcocite is present. Alteration is strong.

P-73. Quartzite breccia begins @1490' and extends to 2534'. Secondary feldspar. Some bleached or "ribbonized?" andesite fragments. "Pebble-breccia" intervals common. Hole bottoms in quartzite, and begins in monzonite porphyry. Strong chalcosite in Bx.

P-78 Drilling Bx from 1132 to 1916. Fragments are andesite and monzonite. Some fragments are extensively altered to biotite---possibly representing Apache diabase.

P-79. Drilling: Quartzite breccia as in P-74. Depth 900-935'. Strong alt. and hematite.

J.E. Kinnison

JEK:lzb

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE - Spot Check

HOLE NO. P-63
Sheet No. 2 of 2
Date Completed 1-7-69
Logged By JEK (SRD)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay - % Cu			Mineralization					Alteration		Rock Type	Remarks
					Total	Non-S	Average	Oxides	Pyrite	Cpy	Cc	Other				
2616	to														"	
2682	66'														Qtzt	Arkosic. Biotite in thin str's -
																bedding? 20°. Tot Sul's 2% Pyr>cpy.
2758	76'														An Grit	Contact with Qtzt above not recovered.
																A few volcanic Porphry frag's--
																Latite/Andesite. Lower contact
																gradational, suggestive of "Ribbon Rock."
276[illegible]	7'														Ark Qtzt	40° bedding
27[illegible]	29'														An & Chlorite after Biotite aggr's with	
															An Cgl	Sul's. Tot Sul's 3% est.
		Bottom of hole.													Or Bx	Some large blebs of Pyrite are rimmed
																byChl-Biot, & that then rimmed by Qtz.

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE Spot Check

HOLE NO. P-64
Sheet No. 1 of 1
Date Completed 1-6-69
Logged By JEK (PDB)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu Total	Non-S	Average	Mineralization Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
908	to															
974	62								x	x			Ser. on		An Tuff?	Tot Sul est @ 3%. St bio alt. Some
													Stringers			secondary orthoclase. Tr gyp Sulfides
													Bio pervasive			as diss. grns & some as stringers
974	to															
008	34	Skip														
028	20								x	x			Orthoclase		An Grit	Tot Sul 3% est. Qtz-Ortho Sul occur
																in thin vlts w/a border of blched die?
																Pervasive alt is fine gr bio & grn
																kooler? of the fold's.
109	81								x	x					See Remarks	Thick sect. 99 & 0x An. Local
																sty Qtz-Ortho w/considerable cps.
270	161	Skip														
280	10								x	x			Ortho-bio		An Grit	Some as ivt 1008-1028 above, except
																stiger bio pervasive.
308	28												Str ortho-Qtz			
															cool Gr?	Cnt @ 1280. bio psendomorphically
																rxtl. Tot Sul est 2%-mostly cpy.
360	52								x	x					Co	Alt as above but less intense Oris
																rt fabric more obvious

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE — SPOT CHECK

HOLE NO. P-72
Sheet No. 1 OF 1
Date Completed 1-7-69
Logged By JEK (SRD)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay - % Cu Total	Non-S	Average	Mineralization Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
083	START															
111	38'														AnGrit	(1083-1085 Mz) (1097-1100 Mz) Chrys on frac's & absorbed into phenocrysts.
365	254'	SKIP														
383	18'														Mz	Mod Biot Alt – Sul's weak Pyr = Cpy Feldspars Kaolinized, Mod Chl on frac's, Minor secondary orthoclase.
570	187'	SKIP														
1605	35'														Mz	Similar to above, Tot Sul's 2.5% Cpy > Pyr. Num Chl shrs.
1611	6														DHF	Strong Mag & Actinolite, Cpy Est. 2% Chl Alt from actinolite.
1623	12														Mz	Strong clay, weak sul's
1667	44'														DHF	Cut by act-chl veins, Sul's spotty, overall ave = 3% Pyr > Cpy
1678	11'														Mz	Tight int contacts upper & lower
1689	11'														Alt L.S.	Act-Biot in bands. Bedding layers dip 30°. This unit contains narrow bands of calc Arg. Sul's less than 1%
1701	12'														Mz	Weak alt of Biot to Chl. Tot Sul's = 0.5%.
701 = END		OF	LOGGING		FOR	THIS	HOLE.									

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE – Spot Check

HOLE NO. P-73
Sheet No. 1 of 1
Date Completed 1-7-69
Logged By JEK (SK)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu Total	Non-S	Average	Mineralization Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
7-1005	18'														Mp	Br. Lim & Feldspars slightly altered Biotite Appears moderately [illegible] Former Sul's Est. 2%.
-1202	197'	Skip														
-1251	49'	Skip													Mp	As Above
1490	~~239'~~														Bx	Leached [illegible] Mp, possible Breccia Pipe, similar to Hole P-74 – Matrix Cem with yellow Lim – Transport Some Sect's the Bx is strongly healed. Vert Frac's Mineralized.
1540	50'	Insert 1490			239'		Skip									
-1720	180'	Skip														
-1730	10'														Bx	Frag's strongly alt. resid. Cc grns among Lim.
-1809	79'												Tr Chl		Bx	Strong supergene leaching tot sulfides est. 4%, well replaced with Cc. Tr chloritic alt. some pink orthoclase.
-2383	574'	Skip														
-2427	44'														Bx	Qtzt & some Bn healed together Tot Sul's 3.5% Pyr & Cpy second orthoclase
2534	107'	Skip														
-2613	79'														Qtzt	Tot Sul's 2.5% Pyr to Cpy = 2:1 2565 – 10' of Biot aggregates + sec. Feldspar [illegible] in Cpy.
2613	End of Logging.															

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE – Spot Creek

HOLE NO. P-75
Sheet No. 1 of 1
Date Completed 1-8-69
Logged By JEK (CSRD)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu: Total	Non-S	Average	Mineralization: Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
26 To																
660	234'														HF	Act and Sepp. Bd dips @ 35° – 45°. Sul's erratic. High-grade assays replaced erratic thick veins of Cpy. Biot alt locally. Rock was interbedded dolomite and C-Arg
700	40'	Skip														
726	26'														C-Arg	Bedded calc arg & alt ls. (Chl – Act?) Sul's erratic.
749	23'														Gran.	(Coolidge). Alt/sul's weak. Upper contact is chl shear – post-ore

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE – SPRING CREEK

HOLE NO. P-74
Sheet No. 1 of 2
Date Completed 1-6-69
Logged By JEK (PDB)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu: Total	Non-S	Average	Mineralization: Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
0-925	55							✓					St. supergene		Ap	grn Cu Ox to 915'
													Clay, pervasive			
													bro. residuals			
													after pyr			
-954	29												Ser. Qtz-Orth.		Ig rk.	St. bleaching by oxidation
984	30'												MS Above plus		Ig rk.	
													pervasive fine bio			
-1010	26'							✓					fine clas. bio.		Ap	~~and Qtz-Pot~~
-1025	15'									Review suggests					Drk Qtz	upper end not removed - possible fault
-1042	17'									this entire column					Qtz BX	
-1059	15'									below 1010' is						
										Qtz BX - poss.						
										a breccia pipe,					Drk Qtz.	
										to end of log						
-1064	7'							St. Crys.		@ 2236'.			Tr diss		Qtz.	Cig. pure Qtz veins
-1097	33'														Qtz BX	
-1260±	163'														Qtz	massive drk Qtz - Below a fault - 3ft Qtz at 1173 - 1188 2ft Qtz Breccia
-1281	21'												St.		Qtz (?)	Was have been Ig rk. Former sulf. 2½%
															Qtz-Orth.	Leach out.
1301	20'														Qtz. BX	
-1412	111'														Qtz?	1 1/2 [illegible] 0.5 Cu. I don't see how parts look like Grey-Bolo
-1419	5'												Very fresh		Ap	bottom not tight intrusive (Pegl core?)
-1636	219'												Secondary Ortho		Drk Qtz	

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC - ASSAY LOG

Property Lakeshore - Spot Check

HOLE NO. P74
Sheet No. 2 of 2
Date Completed 1-6-69
Logged By JEK (PDB)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay - % Cu Total	Non-S	Average	Mineralization Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
1649	13'														Qtzt Bx	1/4" pebbles
1687	38'										✓				Ark'c Qtzt	Cc@1670-1680 Cc at 1684
1719	32'								✓	✓		Nat Cu			Arg.	Native Cu below 1704 py & cpy throughout
[illegible]-1858	139'														Ark'c Qtzt	base of oxidation @ 1858 Cc [illegible] short intercepts of Nat Cu
[illegible]-1960	102'								✓	✓	✓				Arg.	Considerable chl & actinolite? (Ls. group?) total sulf varible 0.5 - 4.0% py greater than cpy Cc in upper 20 ft
2147	187'	SKIP														
-2159	12'														Ark'c Qtzt	
-2236	77'								✓	✓					Qtzt Bx	chl between pebbles, wt sul. total sul. 1.5% est.
																End of logging

inal Depth
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ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE – Spot Creek

HOLE NO. P-75
Sheet No. 1 of 1
Date Completed 1-8-67
Logged By JEK (SRD)

pth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu			Mineralization					Alteration		Rock Type	Remarks
					Total	Non-S	Average	Oxides	Pyrite	Cpy	Cc	Other				
6 To																
60	234'														HF	Act and Strip. Bd dips @ 35° – 45°. Sul's erratic. High-grade assays reflect erratic thick veins of Cpy. Biot Alt locally. Rock was interbedded dolomite and C-Arg
700	40'	Skip														
72[illegible]	26'														C-Arg	Bedded calc arg. & Alt Ls. (Chl – Act?) Sul's erratic.
749	23'														Gran.	(Coolidge). Alt/Sul's weak. Upper contact is Chl shear – Post-ore

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property Lakeshore – Spot Check

HOLE NO. P-78
Sheet No. 1 of 1
Date Completed 1-8-69
Logged By JEK (DDB)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu: Total	Non-S	Average	Mineralization: Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
32-1764	32'														Bx	Dominated by [illegible] frags [illegible] Blended. [illegible] vols. [illegible] Frags. Origin of Bx [illegible] – [illegible] Bx pipe
1817	53'														Bx	Same as above
1819	32'														Bx	Similar to above. Small Frags of Biotitized diabase(?) – Possibly apache [illegible]
1862	13'														and.	Biotite alt. Tight intrusive upper [illegible]
1916	54'														Bx	Similar to 1817-49. Frags are andesite, [illegible], and diabase(?) st. alt. to biotite, hm scarce – limited to fractures. Rock blached, hard.
																Lower limit of intense hem. flooding of rock about 1825'. Hem/Lm sparse below.
end of spot checks 1/8/69																

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property [illegible] – Spot Check

HOLE NO. P-70
Sheet No. 1 of 1
Date Completed 1-8-69
Logged By JEK (PDB)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu			Mineralization					Alteration		Rock Type	Remarks
					Total	Non-S	Average	Oxides	Pyrite	Cpy	Cc	Other				
900-935	35'														Bx	Qtzt frags & some sericitized porphy [illegible]
																[illegible] P-53, P-74. Transported [illegible]
																Cu min visible
																Start NX Core @ 900'

Final Depth
Collar Elevation
Coordinates
Inclination

ASARCO

GEOLOGIC – ASSAY LOG

Property LAKESHORE – Spot Check

HOLE NO. P-80
Sheet No. 1 of 1
Date Completed 1-8-69
Logged By JEK- (PDB)

Depth	Interval	Core Size	Sp Grav	Core Rec %	Core Assay – % Cu Total	Non-S	Average	Mineralization Oxides	Pyrite	Cpy	Cc	Other	Alteration		Rock Type	Remarks
5-883	28'														Postmin Cgl	Red hem-maty, principally ang dn frag ¼"-1" common one 14" boulder. Qtz-Mong w/ Ser alt. as frags. Of andes, grp clasts equall div. among Silver Bell, mess. Ang. & dn grit.
-956	73'														Cgl	Postmin. Harder than above, less red in matrix
-[illegible]2	66'														Cgl	Similar above. Well indurated
	end of spot checks 1/8/69															

6 22. 4836

To: HAWLEY & HAWLEY
Assayers and Chemists, Inc.

From: ASARCO
Tucson Unit

(For Customer's Use)
Run for Total Cu
& Non Sul Cu
Save pulps
Return rejects

Attn RD Karvinen

- [x] Single Analysis
- [ ] Verified Analysis*
- [ ] Geochemical Analysis
- [ ] Spectrographic Analysis

*Verified Analysis will be run unless otherwise specified

Nov 28 1968

Page 1 of 1 pages

Silver Bell

Interval	Sample No.	Au	Ag	Pb	Cu	NS Cu	~~Mo~~ TCu	NS	
846 - 1081	P-1 A				0.48	0.11	.510	.046	
850 - 968	P-30				0.35	0.23	.326	.166	
968 - 1064	P-30				0.67	0.22	.772	.070	
962 - 1038	P-55				0.65	0.10	.756	.028	
038 - 1145	P-55				0.66	0.05	.762	.060	
050 - 758	P-56				1.36	0.16	1.540	.016	
758 - 940	P-56				0.53	0.06	.848	.006	
876 - 930	P-64				1.60	0.63	1.902	.046	
068 - 1158	P-68				0.37	0.04	.426	.010	
158 - 1377	P-68				0.49	0.04	.548	.006	
124 - 1290	P-69				1.22	0.08	1.442	.016	
					.76	.15	.89	.043	