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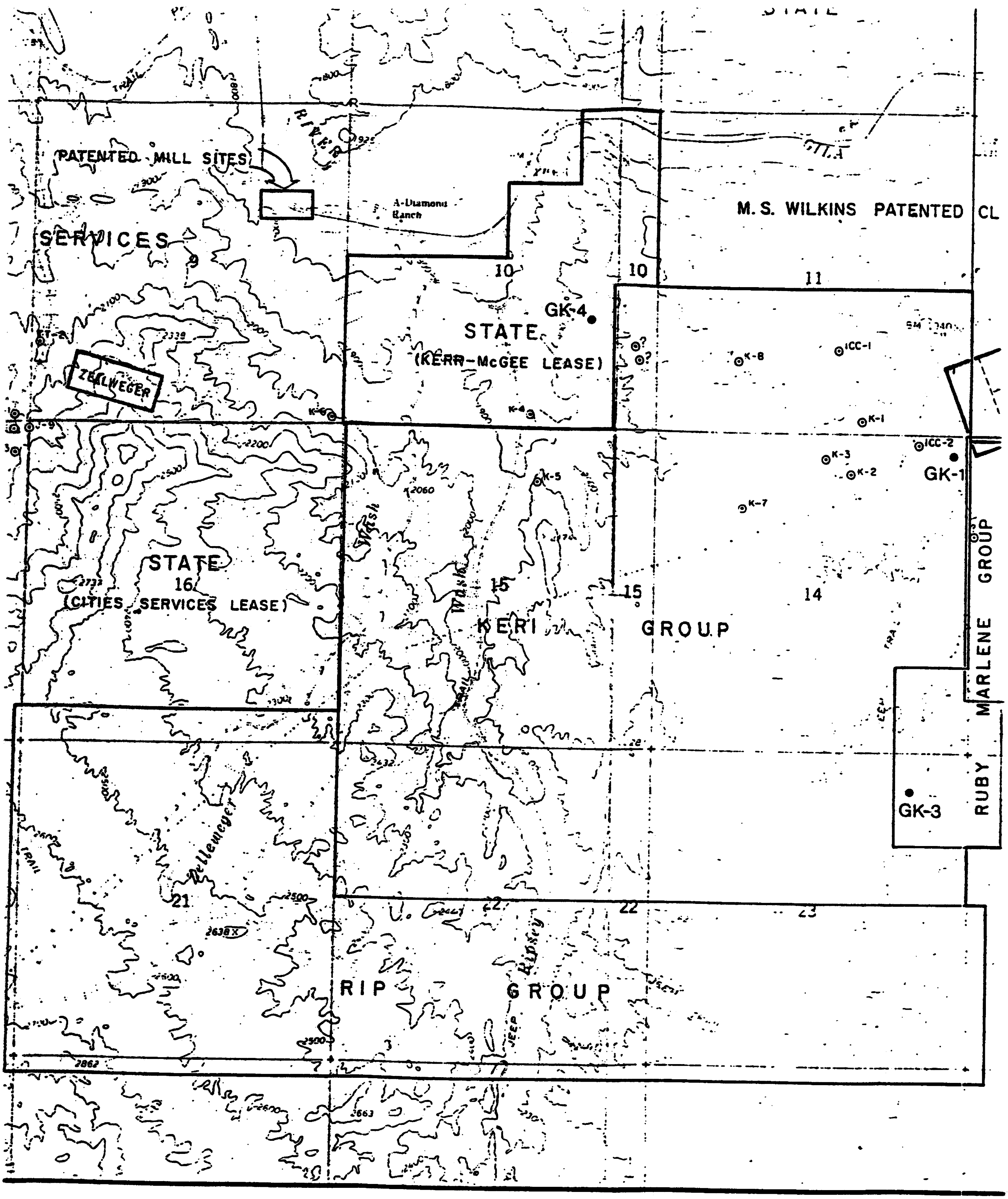

PATENTED MILL SITES
SERVICES
A-Diamond Ranch
RIVER
GILA
M. S. WILKINS PATENTED CL
9
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GK-4
STATE
(KERR-McGEE LEASE)
ZELLWEGER
K-6
K-4
K-8
ICC-1
K-1
ICC-2
GK-1
K-3
K-2
K-5
K-7
STATE
16
(CITIES SERVICES LEASE)
15
15
14
KERI
GROUP
MARLENE GROUP
RUBY
GK-3
21
22
22
23
RIP
GROUP
Zellweger
Wash
Wash
2060
2733
2638X
2862
2663

KERR-McGEE CORPORATION

District Riverside-Kelvin
Hole Number K-2
Spudded 2/24/73
Completed 3/28/73
Total Depth 1377'
Driller Joy Mfg.
Logged By D. A. Wolfe

County Pinal State Arizona
Claim 18-19 Sec 14 T.4 S R.13 E
Elevation 2160
Hole Size
Core Size NX
Hole Angle Vertical
Collar Coords. 620 ft FNL N.
1980 ft FEL E.

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
Started Coring at 20									
20						Precambrian Quartz Monzonite	Coarse grained, somewhat porphyritic; near surface material weathered to clay-chlorite; gravelly, broken material.	Weak propylitic; strong clay-chlorite, all mafics altered to chlorite; some original fresh biotite no quartz veinlets	NO pyrite
50	25		23201	.002					
70							Less broken, occasiona fresh K-spar phenocryst	Alteration remains weak propylitic; weak, pervasive carbonate.	
75	25		23202	.0022					
96						Fault	Pervasive clay-chlorite; intensely sheared, ground material to 120'.		
100	25		23203	.001					
120									
125	25		23204	.0016			Rock is less brecciated, more compact.		
150	25		23205	.0013					
160							Below 160'-locally fresh K-spar and plagioclase faces.	160'-minor sericite on fractures.	
								162.5'- 1/8 - 1/16" fracture with tourmaline	
175	25		23206	.0010				175'-major calcite on 1/8" veinlet.	
179						Fault	At 40° - 2' of gouge		

District Riverside-Kelvin | Hole Number K-2 | Page Number 2

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
181						Quartz Monzonite	Light gray-pink, porphyritic, some fresh biotite.	183-185'-Manganese an occasional quartz veinlets; very weak, original magnetite.	No sulfides
200	25		23207	.0008				Fresh appearance, no veinlets or secondary minerals. 215' - increasing clay and chlorite	
224						Fault	Dip at 35°, intensely sheared, granulated material		
225	25		23208	.0011		Quartz Monzonite	As above. Extreme local fracturing, weak to moderate fracturing throughout rock to 240.	227-229' - Manganese on fractures. Pervasive carbonate material.	
250	25		23209	.0017					
260							260-264 - extremely sheared, granulated.		
275	25		23210	.0011			More or less fracturing to 290'.		
291						Fault	Dip?, fractured, sheared, granulated.	Strong chlorite-clay	
300	25		23211	.0011					
315						Quartz monzonite	Sheared, granulated; fault material (?) to 330'.		
325	25		23212	.0013					
331.5						Diabase	Black, aphanitic, slightly to moderately fractured.	Chlorite strong; calcite on all fractures; chlorite-clay-talc alteration is pervasive	Very minor, very fine grained, disseminated and veined pyrite; almost invisable at less than 2X on binocular miscroscope; very minor very fine grained chalcopyrite with pyrite along chlorite veinlet.
350	25		23213	.0047					
375	25		23214	.0061					

District Riverside-Kelvin   Hole Number K-2   Page Number 3

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
380								Diabase	Fine grained-aphanitic black with minor fracturing with chlorite veinlets; calcite	Abundant black-green chlorite, minor calcite veinlets; calcite varies proportionately with amount of fracturing, some green montmorillonite.	Very minor, fine grained, disseminated pyrite and chalcopyrite in 5:1 ratio.
400	25		23215	.0092							
425	25		23216	.0060						415'-moderately abundant borite on fractures; minor relict magnetite grains; moderate montmorillonite.	
450	25		23217	.0079							As above - very minor sulfides
475	25		23218	.0063						475'-abundant calcite on fractures.	
490.5										Very little chlorite near contact, weak propylitic; medium strong clay caused by shearing; chlorite, little to no magnetite.	
491	16		23219	.0062				Precambrian quartz monzonite	Rough-course grained, fractured, granulated near contact; contact at 30° cut by calcite veinlets.		Little to no sulfides
508									Moderately brecciated below 508'.	Argillic-chlorite	
520									little to no brecciation		
525	34		23220	.0012							
530									Strong brecciation below 530'.	Strong chlorite-clay.	No sulfides
550	25		23221	.0007					540-570' - fault or shear zone; intense brecciation, fracturing to 590;	Strong chlorite-clay; red hematite stain on fractures after oxidized magnetite to 620.	No sulfides
575	25		23222	.0013							
590											
600	25		23223	.0009							

District Riverside-Kelvin Hole Number K-2 Page Number 4

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
625 627	25		23224	.001		Precambrian Quartz Monzonite	627-634 - fault breccia	Propylitic-clay-chlorite	No sulfides
640						Diabase	Contact at 50°; fine grain, black-green; appears like breccia dike	Chlorite-montmorillonite, strong late calcite; epidote on some fractures and locally disseminated.	Very minor, spotty pyrite and chalcopyrite.
650	25		23225	.0080					
653						Precambrian Quartz Monzonite	As above, some continued brecciation.	Clay-chlorite	No sulfides
675	25		23226	.0013					
							690-95' - fault(?) breccia	Clay-chlorite calcite	No sulfides
700	25		23227	.0015					Below 700' very minor, very fine grained disseminated pyrite in chlorite after biotite.
702								702' chlorite-epidote veinlet; local areas of moderate sericite with fresh biotite (secondary?); occasional quartz veinlet faint increase in magnetite.	
725	25		23228	.0220					
737									737 - quartz-sericite-chlorite zone with minor hematite after very fine grain oxidized chalcopyrite.
743								Rock is still oxidized 60-70%.	743 - quartz-sericite along fracture with hematite after weak chalcocite.
750	25		23229	.010				750' Moderately strong magnetite; locally fresh k-spar	775' quartz veinlet at 5° with occasional speck of chalcopyrite
								Magnetite-quartz-chlorite K-spar (pink) very fresh looking	782-787 - Fracture system filled with magnetite, quartz, chlorite, locally abundant pyrite disseminated and in veinlets.
775	25		23230	.0804				Note - below 700' rock is beginning to change from weak propolitic to weak potassic-first effects of potassic alteration are apparent.	785.5 - moderately abundant blebs of chalcopyrite in fracture system.

Alteration is still quite some distance from strong c. but changing favorably.

District Riverside-Kelvin | Hole Number K-2 |

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
792						Precambrian Quartz Monzonite	As above	Gradational propylitic to weak potassic; approximately one quartz veinlet per 3 feet, locally fresh K-saprs; increased magnetite to moderately abundant	792'-quartz-chlorite veinlet at 30° with halo disseminated outward of sericite, pyrite and minor limonite after chalcopyrite-chalcocite coated.
800	25		23231	.0748					801'-hairline veinlet of pyrite and chalcopyrite in 1:1 ratio in fresh, pink orthoclase. 804.5'-locally abundant chalcopyrite in quartz-chlorite-magnetite cluster.
810	10		23232	0289				Generally fresh K-spar, abundant magnetite.	809-10' - pervasive quartz-sericite-pyrite with local large blebs of chalcopyrite and very fine grain disseminated MoS_2. Average veinlets quartz-sericite at one veinlet per 1-2 feet. 810.5' - hairline chalcopyrite veinlet at 30°.
820	10		23233	0110					813' - Several near-vertical chalcopyrite veinlets. Minor disseminated pyrite and chalcopyrite in 5:1 ratio.
830	10		23234	0347				829' - K-spar altered to clay, sericite little to no magnetite, overall chlorite is more abundant.	825'-large MoS_2 grain intergrown with chlorite after biotite. 829.5'-fracture zone with chalcopyrite, pyrite in gouge
840	10		23235	0454					841' 1/16" quartz-pyrite-magnetite-chalcopyrite veinlet at 0° to core axis.
850	10		23236	0183					847.5' - quartz-sericite-pyrite-MoS_2 veinlet with minor chalcopyrite. 853-54' - general zone of near-vertical quartz-sericite veinlets with abundant pyrite, chalcopyrite in 1:1-2 ratio.

District Riverside-Kelvin Hole Number K-2

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
855						Precambrian Quartz Monzonite	Course grained, porphyritic, locally cohesive due to stronger alteration.	Weak potassic with chlorite-magnetite and numerous quartz-K-spar-chlorite veinlets; minor local calcite, chlorite only after biotite in disseminated sites; 861' - minor fresh, secondary biotite associated with magnetite-chlorite clusters.	855-856 - near-vertical quartz-sericite-pyrite-chalcopyrite veinlet approximately 1/2" wide.
860	10		23237	0666					860' - near-vertical, 1/4" quartz-K-spar-pyrite-magnetite veinlet with minor chalcopyrite. 864.5-665' - near-vertical 1/8-1/4" quartz-magnetite-sericite-pyrite chalcopyrite veinlet; pyrite:chalcopyrite ratio at 1:2-4.
870	10		23238	0282				868.5' - Stronger chlorite, no fresh biotite; occasional chlorite-pyrite shear planes.	871.5' - 1/8-1/4" veinlet at 5-10° with minor pyrite, chalcopyrite. 880 - quartz-sericite-pyrite veinlet with moderate chalcopyrite.
880	10		23239	0906					880-83 - near-vertical quartz-sericite veinlet with sericite halo containing abundant very fine grained, disseminated MoS_2 and minor chalcopyrite.
884								884' - strong magnetite in veinlets.	
890	10		23240	0455				Rock is less fresh, more broken; chlorite is more abundant, plagioclase is clouded to argillized.	889-894' - near-vertical chloritized shear with locally abundant MoS_2, moderately local chalcopyrite. 894-96' - occasional hairline chalcopyrite veinlet cuts fresh K-spar.
900	10		23241	0576					897-903' - near-vertical shear. 904' - quartz veinlet with local blebs MoS_2.
910	10		23242	0664				Rock is fresher appearing below 925', less alteration of plagioclase, abundant disseminated magnetite.	908.5' - quartz-chalcopyrite-MoS_2 veinlets (hairline). 912-13' - quartz-sericite-magnetite with minor chalcopyrite.

District Riverside-Kelvin Hole Number K-2 Page Number 7

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
920	10		23243	.0446		Precambrian Quartz Monzonite	Coarse grained, pink with large pink K-spar phenos. With some introduced quartz-magnetite and K-spar.	Weak potassic with quartz-sericite-magnetite veinlets; little to no secondary biotite, original biotite altered to chlorite and magnetite; local zones of veined quartz-K-spar-chlorite with pyrite, chalcopyrite.	920-21' - 1/8-1/4" quartz-sericite-magnetite veinlet with pyrite and moderate MoS_2. 921.5' - quartz-magnetite veinlet with abundant chalcopyrite. 925.5' - 1/8" quartz-sericite-pyrite veinlet at 30°. 926.5' - disseminated chalcopyrite in fresh biotite cluster.
930	10		23244	.0188				Quartz-K-spar veinlets are numerous.	929' - 1/8" quartz-chlorite-chalcopyrite veinlet at 30°. 931-33' - numerous quartz-K-spar-sericite veinlets carrying minor chalcopyrite.
940	10		23245	.0049			940-950' - brecciated, granulated, sheared.	Intense clay-sericite-chlorite.	936' - near-vertical quartz-magnetite-sericite veinlets with moderate, very fine grain chalcopyrite. 946' - moderately abundant MoS_2 in sheared granite. Spotty, minor MoS_2 to 951.
950	10		23246	.0235					951.5' - 1/8-1/4" quartz-magnetite-sericite veinlet at 85° with abundant chalcopyrite. 955-56' - 1/4" near-vertical quartz-sericite-magnetite-chlorite vein with abundant pyrite, moderate chalcopyrite.
960	10		23247	.0208				759 - minor possible alunite alteration of plagioclase; pervasive quartz-sericite-magnetite and K-spar veinlets. Strong clouding of plagioclase and chlorite on fractures persists. Below 964 - rock becomes fresher with less chlorite; minor secondary biotite.	Overall total sulfides approximately 1-2% with 2-4:1 pyrite:chalcopyrite ratio. 962-964.5' - 1/8-1/4" near-vertical quartz-sericite-magnetite veinlet with abundant pyrite, minor chalcopyrite. 966.5' - near-vertical, 1/8" quartz-magnetite-chlorite veinlet with abundant chalcopyrite.

District Riversíde-Kelvin   Hole Number K-2

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
970	10		23298	.023				Precambrian Quartz Monzonite		As above with locally intense shearing associated with quartz-sericite-chlorite material, becoming pervasive clay-sericite-chlorite alteration below 980'.	
980	10		23249	.0284					970-1000' - rock is extensively sheared, broken, with alteration weaker but pervasive; carbonate on fractures		980' - MoS_2 on shear plane 983' - 1 foot broken zone with very abundant clusters of chalcopyrite.
990	10		23250	.0372						Sericite is pervasive; fresh K-spar phenos Total rock alteration is weak potassic with quartz sericite added	989-994' - pervasive quartz-sericite-magnetite with pyrite, chalcopyrite in 2-3:1 ratio. T.S. approximately 1.5%. Also at 995-96' 999' - 1/8" quartz-pyrite veinlet at 60° with minor chalcopyrite.
1000	10		23251	.0417							1005-1007' - pervasive sericite-magnetite-pyrite with minor chalcopyrite.
1010	10		23252	.0218					Below 1015'-rock appears very fresh	1015' - sharp decrease to no pervasive quartz-sericite-magnetite; quartz-sericite-magnetite continues as veinlets. Quartz-K-spar-pyrite veinlets.	1009-1010' - near-vertical 1/8-1/4" quartz-magnetite-chalcopyrite veinlet. 1116-1119' - 1/16-18" chlorite-magnetite-pyrite veinlet with moderate chalcopyrite. 1119.5' - abundant chalcopyrite on quartz sericite veinlet.
1020	10		23253	.0210							
1030	10		23254	.0052							1037' - abundant chalcopyrite on quartz-biotite magnetite veinlet at 30°
1040	10		23255	.0208						Quartz-K-spar-epidote veinlets contain locally abundant pyrite, little to no chalcopyrite.	1041.5' - 1/4" quartz-magnetite-chalcopyrite veinlet at 60° 1046' - 1/4" quartz-sericite-pyrite veinlet at 50°.
1050	10		23256	.0122							1055-58' - near-vertical quartz-magnetite-pyrite-chalcopyrite veinlets.
1060	10		23257	.0277							1064-65 - 1/2" quartz-magnetite-sericite veinlet at 0° with moderate chalcopyrite

District Riverside-Kelvin   Hole Number K-2

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays No	Rock Type	Rock Description	Alteration	Mineralization
1070	10		23258	.0383		Precambrian Quartz Monzonite	Below 1070 rock loses its original texture and appearance due to increased fracturing and shearing with corresponding increase in sericite	Weak potassic with abundant sericite, disseminated and along quartz-magnetite veinlets.	Very weak pyrite and chalcopyrite in 3-5:1 ratio. Total sulphides have decreased over the last 100' to less than 1%. 1078' - quartz-magnetite-chalcopyrite veinlet.
1080	10		23259	.0149					1085-93' - pervasive sericite-magnetite with locally abundant pyrite, chalcopyrite in 3-4:1 ratio.
1090	10		23260	.0324				Numerous magnetite-sericite and quartz-K-spar veinlets.	
1100	10		23261	.0209					1105-1106 - Several near-vertical quartz-magnetite-sericite veinlets with abundant chalcopyrite.
1110	10		23262	.0150					1109' - quartz-magnetite-sericite with minor pyrite, chalcopyrite.
1120	10		23263	.0182				Sulfides decrease with decreasing amounts of quartz-sericite-magnetite alteration.	1122' - near-vertical 1/16-1/8" quartz magnetite-chlorite-chalcopyrite veinlet.
1130	10		23264	.0057					1123 and 1125' - quartz-magnetite-chlorite veinlets at 40-50° with moderate chalcopyrite.
1140	10		23265	.0049					1139.5' - chalcopyrite on pyrite veinlet 1/8" thick at 80°. 1141' - 2" quartz-K-spar-epidote-chlorite veinlet with minor pyrite, very minor chalcopyrite. 1142-43.5' - sericite-magnetite veinlet at 10° with abundant pyrite, chalcopyrite.
1150	10		23266	.0130			1130-50' - Some possible grayback.		1154' - near-vertical 1/16" magnetite-pyrite-chalcopyrite veinlet
1160	10		23267	.0134					1160' - quartz-sericite-pyrite veinlet at 20°.

District Riverside-Kelvin　　　Hole Number K-2　　　Page Number 10

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1160						Precambrian Quartz Monzonite	Rock is vari-colored due to differing intensities of shattering and shearing.	1160-70' - argillization of plagioclase; strong chlorite on fractures, shears; quartz veinlets average 1-2 per foot, coated with late calcite.	1163.5' - 1/8" quartz-K-spar-biotite-pyrite veinlet at 75° with local blebs chalcopyrite.
1170	10		23268	.0069				1171-73' - near-vertical 1/4-1/2" quartz-K-spar-epidote veinlet with minor chlorite, no sulfides; numerous quartz or K-spar veinlets with no sulfides; magnetite is very abundant.	1179' - vertical, 1/16" chlorite-pyrite veinlet with little to no chalcopyrite.
1180	10		23269	.0051					
1190	10		23270	.0134			1193-97' - intense sericite-chlorite-clay associated with fault (?) breccia.		1187' - 1/4" quartz-pyrite veinlet at 80° with trace chalcopyrite. Minor disseminated and veined pyrite; total sulfides ≤1% with very high pyrite:chalcopyrite ratio.
1200	10		23271	.0297				Strong sericite-clay along fractures and pervasive t. oughout.	Disseminated and veined pyrite and chalcopyrite in 2-4:1 ratio; total sulfide content <1%.
1210	10		23272	.0196					1212.5' - 1/8" quartz-pyrite-chlorite veinlet at 85°. 1213' - disseminated pyrite and chalcopyrite in 1:1 ratio.
1220	10		23273	.0290					1219-22' - numerous fractures (1/16-1/8") at 95-90° with abundant pyrite, minor chalcopyrite.
1230	10		23274	.0141			Possibly inclusion of grayback granodiorite.	1222-32' - Strong K alteration with fresh biotite, K-spar veinlets.	1227-32' - occasional hairline veinlet of chalcopyrite cutting all rock minerals. 1231-32' - near-vertical, 1/4" quartz-magnetite-sericite veinlet with minor chalcopyrite. 1233-1239' - abundant pyrite and very minor chalcopyrite on all fractures-partially oxidized. 1239-1/8" quartz-pyrite veinlet at 75° with abundant chalcopyrite. Note: 1233-37 and 1243-49.5 reddish-brown stain clue to oxidizing, very fine grain bornite.
1240	10		23275	.0191					

District Riverside-Kelvin

Hole Number K-2

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
1250	10		23276	.0257				Precambrian Quartz Monzonite	Course grain, light gray, porphyritic granite to quartz monzonite	Weak potassic	1251-54' - near-vertical quartz-sericite-magnetite-chalcopyrite veinlet. Chalcopyrite abundant.
1260	10		23277	0810						1262' - numerous near-vertical magnetite veinlets	1264.4' - 1/16" quartz-epidote-K-spar-chalcopyrite veinlet at 45° cutting chalcopyrite-chlorite-magnetite veinlet at 60°.
1270	10		23278	0110							
1280	10		23279	0069							
1290	10		23280	0174					1277-1283' - vertical 1/4" pebble dikelet cutting core	Minor weak argillization of plagioclase below 1270; quartz and quartz-K-spar veinlets are abundant	1290' - 1/4" magnetite-chalcopyrite-sericite veinlet at 60°
1300	10		23281	0242							Numerous flat-lying pyritic fractures continue from above
1310	10		23282	0115						Weak argillization of plagioclase continues	1304' - flat pyrite fracture with minor chalcopyrite
1320	10		23283	0308							1312' - pyrite-chalcopyrite-epidote bleb in rock 1318-20' - pervasive magnetite-quartz-sericite with local disseminated chalcopyrite Below 1320' - veinlets and sulfide content drops considerable.
1330	10		23284	0054							1330.5-1331.5' - breccia with disseminated pyrite, minor chalcopyrite and bornite.
1340	10		23285	0087							1341.5' - near-horizontal 1/4-12" pyrite-chalcopyrite veinlet with massive chalcopyrite. 1347' - quartz-K-spar veinlet at 5° cut by quartz-K-spar-epidote-pyrite-chalcopyrite veinlet at 85°.
1350	10		23286	0056							Total sulphide ≤1%.

District Riverside-Kelvin Hole Number K-2 Page Number 12

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
1360	10		23287	.0040				Precambrian Quartz Monzonite		Weak potassic with abundant introduced quartz.	1358' - 1/8" quartz-K-spar-pyrite veinlet at 85°. 1259-62' - numerous near-vertical quartz veinlets with pyrite, minor chalcopyrite. 1367' - near-vertical, 1' vein intercept quartz-magnetite-sericite with moderately abundant chalcopyrite.
1370	10		23288	.0126							1372 and 73' - 1/2-1" quartz-sericite-pyrite veinlets - little to no chalcopyrite.
1377	7		23289	.0047				TOTAL DEPTH			

KERR-McGEE CORPORATION

District Riverside - Kelvin
Hole Number K-3
Spudded 3/30/73
Completed 5/3/73
Total Depth 1386'
Driller Joy Mfg.
Logged By D. A. Wolfe

County Pinal State Arizona
Claim ______ Sec 14 T. 4S. R. 13 E.
Elevation
Hole Size
Core Size NC
Hole Angle Vertical
Collar Coords. 380' FNL N.
2380' FEL E.

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
		STARTED CORING AT 21'.							
						Precambrian Quartz Monzonite	Lt. pink-grey, medium grained, apparently granulated, well-fractured with numerous chlorite-hematite-covered fractures.	Propylitic; all original mafics altered to chlorite. Plagioclase and most K-spar altered to clay, sericite; minor disseminated blebs of epidote; minor Mn stain on fractures.	Very minor blebs limonite after sparse pyrite grains.
75	25		24101	.0024			76-77' Fault gouge - also at 84-85'.		
								100' Extensive hairline fractures with chlorite continue. Rock is only faintly magnetic.	Continued oxidation of very sparse pyrite.
							131-155' Pervasive fracturing, shearing.	Strong clay-chlorite.	
								165' Fresh K-spar, plagioclase with secondary magnetite.	
150 to 175	25		24102	.0018					
								180-200' Intense clay - chlorite and fracturing.	No sulfides.
							198-230' 3' core recovered from fault zone(?) ore extensively sheared, granulated zone.		
								Alteration similar below fault.	

District Riverside-Kelvin   Hole Number K-3   Page Number 2

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
250	25		24106	.0015				Quartz Monzonite		260-270' Abundant chlorite due to abundant hairline fractures.	No sulfides.
275	25		24105	.0026					281-285' Broken, extensively fractured zone.		
300	25		24108	.0016					320' Strong chlorite on fracture planes.		
325	25		24109	.0013					345' Rock is thoroughly shattered.	Disseminated blebs of epidote.	
350	25		24110	.0018				(350-398' Fault Zone)	350' Strong brecciation. 360' Brecciated - altered to clay-chlorite, only original quartz remains.	350-358' Abundant broken veins of milk-white to purple fluorite. 358-360' Massive green clay-chlorite zone.	
375	25		24104	.0020					398' Sharp change to porphyritic rock without pervasive fracturing, shearing.	Very weak potassic alteration with minor pyrite disseminated with magnetite and chlorite; fresh k-spars.	Minor disseminated pyrite.
400	25		24111	.0108							400-401' Near vertical 1/4" quartz-pyrite-chalcopyrite-bornite veinlet, partially oxidized. 404 & 406' Quartz-sericite-magnetite veinlets with abundant chalcopyrite, minor bornite, molybdenite and pyrite. Minor disseminated chalcopyrite and pyrite in 1:1 ratio in biotite-magnetite clusters.
410	10		24112	.0689						Still very weak potassic with occasional quartz veinlets.	416-417.5' Quartz-sericite-magnetite pervasive with locally abundant chalcocite capping on chalcopyrite, partially oxidized.
420	10		24113	.1197							428' Quartz-sericite veinlet with minor chalcocite capping.

District Riverside-Kelvin | Hole Number K-3 |

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
430	10		24114	.135				Quartz Monzonite	Medium to coarse-grained porphyritic rock; shearing minor but still apparent.	Weak potassic with locally abundant chloritized fractures; plagioclase is clouded to pervasively altered to clay and sericite.	Very minor disseminated pyrite, most chalcopyrite is oxidized where disseminated. 433-435' Several 1/16 to 1/8" quartz-chlorite-magnetite veinlets with sericite halos carrying pyrite and chalcopyrite in 1:1 ratio.
440	10		24115	.034					441-444' & 448'-475' Rock is extensively brecciated, shattered; rusty colored rock due to oxidation.	Below 441' Chalcopyrite is totally oxidized. Sericite-clay alteration is dominant over chlorite to 475'.	444.5' Blebs of MoS_2 + chalcopyrite on minor shear plane - MoS_2 and chlorite are smeared. 444-447' Numerous near-vertical chlorite-sericite-chalcopyrite shears or veinlets; chalcopyrite is minor. 447' 1/2-1" quartz veinlet at 10° with abundant chalcopyrite, MoS_2.
450	10		24116	.035							450' Broken quartz veinlet with large blebs pyrite-chalcopyrite in 1:1-2 ratio. 452' Minor disseminated pyrite and oxidized chalcopyrite in 1:1 ratio (?) 458' Chalcopyrite going in breccia [illegible] rimmed by bornite on chalcocite with an outer border of capping limonite - moderately strong chalcocite capping, local blue copper carbonates.
460	10		24117	.060							465-468' Chalcopyrite disseminated and on quartz veinlets with chalcocite and bornite replacing chalcopyrite; rimmed with oxidation limonite. 467-472' Blue copper carbonates on fractures after oxidizing chalcopyrite.
470	10		24118	.048					Below 475' Rock is relatively unshattered.	Clay-sericite restricted to quartz veinlets; plagioclase is relatively fresh.	
480	10		24119	.038							

District Riverside-Kalvin Hole Number K-3

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
480						Quartz Monzonite		Weak potassic with local quartz-sericite-magnetite veinlets.	481' 1/2" quartz-sericite-magnetite-chlorite veinlet at 20° with [illegible] blebs chalcopyrite. 485-486' Quartz-pyrite-chalcopyrite veinlet with abundant pyrite, chalcopyrite in 1:1-2 ratio. 488-489' 1/2" near-vertical quartz-sericite-magnetite veinlets with [illegible] ly abundant pyrite, chalcopyrite in 1:1-2 ratio.
490	10		24120	.220				Below 495' Sericite becomes more predominate.	490' Quartz-sericite-magnetite veinlet [illegible] oxidized; abundant chalcopyrite being replaced by chalcocite, bornite; chalcocite and bornite are oxidizing to limonite. 495-500' Numerous quartz-sericite-magnetite veinlets with minor chalcopyrite, bornite, chalcocite - oxidizing.
500	10		24121	.062					502-503' Shear, sericitized at 25° to core axis with abundant fine-grained chalcopyrite.
510	10		24122	.033					Numerous quartz-sericite-chalcopyrite veinlets to 510'.
520	10		24123	.019				518' Rusty color due to extensive oxidation. 526' Pervasive quartz-sericite alteration, no magnetite outside of quartz veinlets. Some possible secondary K-spar disseminated throughout rock.	Below 518' - numerous veinlets with chalcopyrite 50-100% oxidized. 526-527' Coarse breccia with abundant pyrite and chalcocite; chalcocite [illegible] capping as fracture fillings.
530	10		24124	.300					Overall total sulfide content much less than 1% with pyrite-chalcopyrite ratio at 1:1.
540	10		24125	.024					539' Near-vertical 1/8" quartz-chlorite-sericite-chalcopyrite veinlet.
550	10		24126	.043					550' Rock is predominantly oxidized with chalcocite-bornite capping and little chalcopyrite. 550-551' 1-2" quartz veinlet with [illegible] blebs chalcopyrite being replaced by chalcocite and showing abundant [illegible] selvage to veinlet.

District Riverside-Kelvin

Hole Number K-3

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
557						Precambrian Quartz Monzonite		557-561' Pervasive quartz sericite-magnetite alteration.	557-561' Abundant veined and disseminated chalcopyrite and minor bornite, locally coated with oxidizing coating of chalcocite, minor [illegible]
560	10		24127	.1413					562-563' Several near-vertical quartz veinlets with associated pervasive quartz-sericite-magnetite alteration containing abundant chalcopyrite and minor bornite - both replaced by chalcocite which is 20-40% oxidized. 563-569' Numerous quartz-sericite-magnetite veinlets with minor chalcopyrite, chalcocite capping.
570	10		24128	.270				Rock appears relatively strongly brecciated with plagioclase altered to clay and sericite, magnetite is abundant in veinlets only.	Overall pyrite:chalcopyrite ratio 1:1-[illegible]. Occasional quartz-sericite veinlets to 577' with chalcopyrite, bornite, oxidizing chalcocite.
580	10		24129	.0340					581-589' Occasional quartz-sericite-magnetite veinlets with more abundant pyrite; chalcopyrite and chalcocite persists.
589.5						Diabase	Contact at 50°. Aphanitic to fine-grained mixture of magnetite, sericite, chlorite.	Weak potassic(?), calcite veinlets.	Moderately abundant chalcopyrite apparently concentrated along quartz-magnetite-sericite fractures.
590	10		24130	.034					
593						Quartz Monzonite	Below 593' drill hole runs parallel to diabase dike, occasionally intersecting nearly-vertical slices of diabase in core. Minor diabase intersections 595 596' and 598.5-599'.	Weak potassic, plagioclase is clouded to sericitized-magnetite locally disseminated.	Sericite-chalcopyrite-chalcocite fracture fillings and disseminated chalcopyrite in diabase. 599' Pervasive quartz-sericite-magnetite with abundant chalcopyrite, bornite, chalcocite, very minor oxidation.

District Riverside-Kelvin   Hole Number K-3

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
600	10		24131	.1260		Precambrian Quartz Monzonite	Coarse-grained quartz monzonite dominant with minor intersections of diabase from probable diabase dike nearly parallel to drill hole. Diabase 599-601', 604-606', 608.5-610', 613.5-616.5'.	In quartz monzonite: plagioclase is locally clouded, magnetite moderately abundant; locally strong sericite in otherwise fresh, weak potassic alteration. In diabase: pervasive chlorite-magnetite-clay-calcite.	Total sulfides <<1% with pyrite:chalcopyrite ratio of 1:1-3. Very fine-grained disseminated chalcopyrite in quartz monzonite, very minor sulfides in diabase. 604' Quartz-chlorite-epidote veinlet along quartz monzonite-diabase contact with abundant chalcopyrite. 605' Local calcite-quartz-chalcopyrite veinlet at 0° to core. 607' 1/16" quartz-epidote-chalcopyrite veinlet at 20°.
610	10		24132	.040					610' Vertical 1/4" quartz veinlet carrying occasional blebs [?] chalcopyrite; diabase locally has minor MoS_2 as smears on shears. 610.5-613' Pervasive sericite-magnetite alteration with abundant disseminated and veined chalcopyrite. 615-616' Near-vertical quartz-K-spar veinlet with abundant MoS_2 as rim with magnetite. 617-621' Numerous thin quartz-magnetite-sericite veinlets with pyrite and dominant chalcopyrite.
620	10		24133	.060					
623						Diabase	Aphanitic, dark-green to black, heavily fractured, sheared with abundant chlorite on fractures.	Chlorite-magnetite, abundant secondary calcite.	623' Contact near vertical with abundant chalcopyrite in pervasive quartz-sericite-magnetite. Local quartz-epidote veinlets contain minor chalcopyrite.
630	10		24134	.050					
631						Quartz Monzonite	As above	Weak potassic with quartz-sericite-magnetite veinlets carrying most of chalcopyrite.	631' 1/4-1/2" quartz-chalcopyrite veinlet at 25° with massive chalcopyrite.

District Riverside-Kelvin   Hole Number K-3

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
635						Quartz Monzonit	Shattered, sheared quartz monzonite with local thin intersection of vertical diabase dik	Clay alteration of plagioclase and part of K-spar; strong chlorite; magnetite is less abundant in quartz monzonite.	
640	10		24135	.160					644-646' Near-vertical 1/2" quartz-K-spar-chalcopyrite veinlet with locally abundant MoS2. 647.5' Abundant chalcopyrite on quartz-sericite veinlets at 30°. 648' 1/2-1" quartz veinlet at 20° with locally abundant MoS2. Also at 652.5'.
650	10		24136	.090					
660	10		24137	.170				Strong, pervasive quartz-sericite-magnetite alteration with disseminated and veined pyrite, chalcopyrite and molybdenite; less disseminated magnetite than in rock below; very pervasive green montmorillonite below 669'; grade of chalcopyrite relies heavily on number of veinlets.	Pyrite:chalcopyrite ratio decreases to 1:1 with locally 1% sulfides.
670	10		24138	.270					670-679' Locally abundant quartz veinlets, chalcopyrite and MoS2. 676' Massive chalcopyrite and MoS2 on quartz veinlet.
680	10		24139	.180				688' Local alteration is quartz-chlorite-clay.	680-682' Abundant disseminated pyrite and chalcopyrite in 1:1-2 ratio. 688' Quartz veinlet with several 1" diameter blebs of chalcopyrite. Abundant chalcopyrite continues to 690'.
690	10		24140	.930				Below 690' Amount of quartz-sericite-chlorite-magnetite alteration drops sharply with corresponding drop in sulfides.	696' Partially assimilated quartz diorite fragment with disseminated chalcopyrite.
700	10		24141	.070					
710	10		24142	.100			Below 710' Rock is broken, wall fractured.	Below 710' Slight clay alteration of plagioclase	
720	10		24143	.030					

District Riverside-Kelvin Hole Number K-3 Page Number 8

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
730	10		24144	.060		Quartz Monzonite	Fractured, broken, with zones of pervasive quartz-sericite magnetite interspersed with zones of fresh pink K-spar.	Weak potassic to quartz-sericite with changing alteration corresponding to abundance of quartz veinlets.	730.5' 1/4" quartz-sericite-chalcopyrite veinlet at 20°.
740	10		24145	.180					Total sulfides <1 with pyrite:chalcopyrite ratio at 1:1, [illegible] disseminated sulfides; minor sulfides on chlorite-sericite fractures.
750	10		24146	.320					749 & 751' 1/4" quartz-sericite-pyrite-chalcopyrite veinlet [illegible] with pyrite:chalcopyrite ratio 1-3:1.
760	10		24147	.160				Locally extensive sericite-clay-chlorite alteration to 775'.	762' Several 1/2-1" quartz veinlets with rims of MoS_2.
770	10		24148	.330				Approximately 1-2 quartz-sericite-magnetite veinlets per foot with locally abundant chalcopyrite.	774-775' Disseminated and veined quartz-sericite-magnetite alteration with abundant chalcopyrite.
780	10		24149	.300					780' 1 1/2" quartz veinlet at 30° with abundant MoS_2. Sericite halo 1' wide contains abundant chalcopyrite.
790	10		24150	.040				790-798' Pervasive quartz-sericite-magnetite alteration of core.	790-798' Major zone of disseminated chalcopyrite and minor MoS_2, no pyrite.
800	10		24151	.200				Areas of weak potassic alteration.	806.5' 1-2" quartz veinlet with abundant MoS_2 and moderate chalcopyrite in adjacent quartz-sericite alteration.
810	10		24152	.150					Abundant chalcopyrite and MoS_2 on fractures, veinlets to 810'. 812" 6" quartz-sericite alteration with 2-3% disseminated chalcopyrite.
820	10		24153	.090					821', 1/2" quartz-MoS_2-epidote veinlet.

District Riverside-Kelvin | Hole Number K-3 | Page Number 9

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
823								Quartz Monzonite	As above, but with most plagioclase clouded to argillized.	Weak potassic with minor secondary K-spar, dominant chlorite, minor magnetite	829' 1/2" near-vertical quartz veinlet with chalcopyrite blebs 40-50% replaced by chalcocite.
830	10		24154								834' Quartz-K-spar-chalcopyrite-MoS2 veinlets.
840	10		24155	.040						836-840' Pervasive clay-sericite-magnetite along shear.	Moderately abundant veined chalcopyrite-MoS2. 840-848' Minor quartz-K-spar-epidote-pyrite-chalcopyrite veinlets with pyrite:chalcopyrite ratio of 1:1-2.
850	10		24156	.020							851.5' 1" quartz-epidote veinlet at 30° with MoS2 and chalcopyrite in sericite halo. 859-861' Quartz-sericite-magnetite zone with moderately abundant chalcopyrite, minor MoS2.
860	10		24157	.050							863' Abundant MoS2 on quartz-sericite-pyrite veinlet. Very minor disseminated pyrite, chalcopyrite in 1:1-3 ratio.
870	10		24158	.040						Below 865' Somewhat brecciated with variable degrees of quartz-sericite-magnetite alteration; occasional thin quartz-K-spar veinlet - continues to 890'.	865-890' Minor disseminated and veined pyrite and chalcopyrite in 1:2-3 ratio.
880	10		24159	.060						885-886' K-spar-chlorite-fluorite alteration.	
890	10		24160	.050							891-894' Near-vertical 1/4" quartz-chalcopyrite veinlet with minor MoS2.

District Riverside-Kelvin

Hole Number K-3

Depth	Int.	% Core Recy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
896						Quartz Monzonite		Weak potassic to quartz-sericite; copper mineralization continues to be controlled by quartz-sericite-magnetite veinlets; continued argillization of plagioclase with only minor magnetite except in veinlets.	896-904' Near-vertical shears with moderate chalcopyrite, minor MoS_2.
900	10		24161	.210					
910	10		24162	.170					Total sulfides <1% with pyrite:chalcopyrite ratio of 1:3.
920	10		24163	.140					921-923' 1/4-1/2" quartz-sericite-MoS_2 veinlet.
930	10		24164	.030			932-936' Shear zone.	Extensive chlorite-clay.	
940	10		24165	.090					941' 1/8" MoS_2 veinlet at 20°.
									Below 945' Sharp increase in pyrite content with corresponding decrease in quartz-sericite-magnetite-chalcopyrite veinlets. Overall pyrite:chalcopyrite ratio at 2-4:1.
950	10		24166	.040					
960	10		24167	.030					957-962' Quartz-sericite alteration with moderate to abundant chalcopyrite, 10-15% oxidized with chalcocite rims and local fine-grained native copper. Associated MoS_2 on fracture planes.
970	10		24168	.030				10-60% oxidation of chalcopyrite to 975'.	
980	10		24169	.020				985-1032' Original rock texture gone, rock 60-80% replaced by chlorite-quartz-magnetite assemblage.	985-995' Pervasive quartz-magnetite-sericite with pyrite and chalcopyrite in 1-2:1 ratio, moderate MoS_2 with local quartz veinlets.
990	10		24170	.170					
1000	10		24171	.040					
1010	10		24172	.010				1019' K-spar-chlorite-fluorite replacement of rock.	1013' 1 1/2" quartz veinlet at 30° cutting 1/8" quartz-chlorite-chalcopyrite veinlet at 60°. Minor MoS_2.

District Riverside-Kelvin   Hole Number K-3   Page Number 11

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1020	10		24173	.020		Quartz Monzonite	As described in rock alteration at 985-1032'.	Oxidation of sulfides, 60-80%.	Minor disseminated and veined pyrite and chalcopyrite in 1:1-2 ratio.
1030	10		24174	.050					
							Below 1032' Medium to coarse-grained, grey quartz-monzonite, massive.	Numerous chlorite-magnetite veinlets.	1035' Quartz-K-spar-chalcopyrite veinlet at 40°.
1040	10		24175	.020					1040' Quartz-chlorite-chalcopyrite veinlet at 35° with halo (outward replacement of rock) of K-spar, local native copper.
1050	10		24176	.010				Below 1050'-more abundant magnetite and K-spar veinlets.	
1060	10		24177	.020					1064-1065' Chlorite-K-spar-fluorite with abundant disseminated chalcopyrite to 100% oxidized, relict grains with chalcocite rims.
1070	10		24178	.020			1077-1083' Shear zone at 20°.	Clay-chlorite-sericite-magnetite.	1075'-1076' Extensive disseminated chalcopyrite, minor pyrite, moderate to abundant chalcocite. 1079-1081' Augens of pyrite in shear zone with minor chalcopyrite oxidizing to hematite.
1080	10		24179	.140	Changed from quantitative to geochem assay.		Fresh, granular texture below 1086'.		
1090	10		24180	.083				1090' and below - variable 10-20% replacement of rock by magnetite, sericite, quartz-chlorite oxidation remains high 40-80%.	
1100	10		24181	.049					Local disseminated and veined chalcopyrite with chalcocite rims oxidizing to hematite.
1110	10		24182	.061					
1120	10		24183	.031					
1130	10		24184	.035					1124' Chloritic shear with abundant pyrite. Pyrite-chalcopyrite ratio below 1125' is 1:1.
1140	10		24185	.0725				Chlorite-magnetite predominant; plagioclase is altered to clay sericite.	1139 & 1140' Sericite-chlorite-pyrite with minor chalcopyrite on veinlets.

District Riverside-Kelvin   Hole Number K-3   Page Number 12

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1140						Quartz Monzonite		1148-1163' Pervasive quartz-sericite-chlorite-magnetite with minor amounts of secondary K-spar.	Lower pyrite:chalcopyrite ratio [illegible] increase in chalcopyrite content; pyrite:chalcopyrite = 1:1-4.
1150	10		24186	.0274					
1160	10		24187	.0947					1158.5-1159' Locally abundant chalcopyrite replaced 10-50% by bornite and chalcocite, oxidizing to red-brown hematite.
							Shattering of rock is more intensive.	Oxidation of chalcocite-chalcopyrite is 70-100% complete below 1166 to 1180'.	
1170	10		24188	.0387					1176' 1/4" chalcocite veinlet at 30°, 50-80% oxidized.
1180	10		24189	.0530					
1190	10		24190	.0200				Below 1190' Rock texture is more pronounced due to absence of sericite-magnetite alteration; plagioclase is altered to clay, sericite.	Total sulfide content <1% with 1:1-2 pyrite-chalcopyrite content. 1198' 1" quartz veinlet at 30° with minor K-spar epidote, chalcocite and chalcocite capping after chalcopyrite. 1199-1200' Near-vertical quartz-sericite-magnetite veinlet with moderate to abundant chalcopyrite, partially oxidized, and minor MoS_2.
1200	10		24191	.0465					
1210	10		24192	.0018			1215' Shear zone at 30°(?) continues to 1236'.	Pervasive chlorite-sericite-magnetite.	
1220	10		24193	.0052				Alteration below fault or shear is weak potassic to quartz-sericite with abundant chloritized fractures.	Sulfides below shear are predominantly pyrite. Total sulfide content <<1%.
1230	10		24194	.0054					1234' 1/4" quartz-sericite veinlet at 30° with minor pyrite.
1240	10		24195					Local epidote associated with secondary K-spar.	1246-1247' Quartz-sericite-K-spar introduced.
1250	10		24196	.0056					Pyrite:chalcopyrite ratio = 5:1 with <1% total sulfides.
							1259' Alteration has clouded most of original rock texture.	Weak potassic to quartz, sericite.	1259-1261' Quartz-sericite-K-spar epidote replacement of rock with minor disseminated chalcopyrite oxidized and more abundant pyrite.
1260	10		24197	.0072					
1270	10		24198	.0043					

District Riverside-Kelvin　　Hole Number K-3　　

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1280	10		24199	.0059		Quartz Monzonite			1280.5-1283.5' Pervasive quartz-sericite alteration with abundant MoS2 disseminated and along quartz veinlets. 1284-1286' Near-vertical 1/2" quartz veinlet with local blebs of pyrite and epidote.
1290	10		24200	.0026				Weak potassic to quartz-sericite with abundant fresh K-spar, magnetite-sericite-quartz.	1296-1297' Pyrite:chalcopyrite veinlets with chalcocite on chalcopyrite and pyrite; 40:80; oxidized flourite on veinlet at 1296'.
1300	10		24001	.0076					
1310	10		24002	.0057					1313-1315' Zone of pervasive quartz-sericite-pyrite alteration, very minor chalcopyrite; pyrite is veined and disseminated with chlorite and magnetite.
1325	15		24003	.0123				Pervasive quartz veinlets and chlorite-magnetite alteration to 1350'.	1325' 6" section K-spar-chlorite-flourite with disseminated pyrite. 1326' 1/2" quartz-chlorite veinlet at 60° with abundant MoS2.
1350	25		24004	.0098					1343'-1353' Locally pyrite:chalcopyrite ratio drops to 1:1 with chalcopyrite 10-60% replaced by chalcocite?oxidizing to hematite.
1375	25		24005	.0034				To T. D. Quartz veinlets contain little to no sulfide material, usually pyrite, quartz veinlets are abundant, K-spar fresh, locally secondary.	Minor chalcopyrite, 10-50% replaced by oxidizing chalcocite.
1386	11		24006	.0026					

-1386 FEET IS TOTAL DEPTH-

Riverside Mining Dist.
144 claims
8 miles sw of Ray
A target?

CORN and AHERN
2705 W. Lambert Lane
TUCSON ARIZONA 85741
Ph. (602) 297 3858

August 21, 1992

Randy Moore
CAMBIOR Exploration USA, Inc
230 S. Rock Blvd. Suite # 23
Reno, Nevada 89502

RE: Kelvin Porphyry Copper Prospect, Pinal County, Arizona

Dear Randy,

Enclosed is a brief summary of our copper prospect at Kelvin. The significant features of this target are:

1. The tartget lies within one of the major copper producing districts in Arizona

2. A mappable Porphyry Copper alteration system is exposed and was encountered in drill holes nearby.

3. Projection of the axis of the rotated porphyry alteration system into a down faulted block overlain by listric faulted blocks of granite and rotated blocks of Tertiary age conglomerate.

4. Drill hole evidence that overlying, listric faulted horizons can be as thin as 200 feet.

5. No drill holes test the target although there are a number of holes in the general area.

6. The entire target is held by claims in our name, without any underlying interest.

We have copies of additional data from prior work, and look forward to showing you this structurally complex area on the ground.

Sincerely yours,

Dick

RICHARD AHERN

CORN & AHERN
CONSULTING GEOLOGISTS
8425 Desert Steppes Dr.
Tucson, Arizona 85710
(602) 298-1770

KELVIN PROSPECT

General Terms

1. Advance Royalty payments -$15,000 on execution,$15,000 on the 1st anniversary, escalating to $20,000 on the second, $30,000 on the 3rd, $40,000 on the 4th, $50,000 on the 5th and thereafter.

2. 5% NSR production royalty with advance royalty recoverable from production.

3. Payments indexed to CPI or similar index.

4. Assessment & Filing obligations.

5. Notification of termination six months prior to Sept. 1st or complete assessment requirements.

6. Supply geologic and drilling data upon termination.

Kelvin Porphyry Copper Prospect

Pinal County, Arizona

Exploration Potential:

The Kelvin prospect is a structurally-rotated porphyry copper alteration/mineralization system cut and displaced by low-angle faults similar to San Manuel-Kalamazoo with the majority of the system faulted down to the west and concealed beneath a relatively thin, structurally displaced cover consisting of shattered Precambrian granite and rotated Tertiary sedimentary rocks. Geologic data indicates that the displaced upper part of the porphyry copper system should be preserved beneath the structural cover and that there would be potential for higher-grade copper mineralization in reactive diabase and perhaps Paleozoic limestones. Geologic maps and the exposed breccia pipe at the Wooley Mine, indicate that the structural cover on the west side of Ripsey Wash may be relatively thin. Remnant, fault-bounded segments of the alteration system that are exposed near Kelvin and Riverside exhibit supergene chalcocite mineralization and a sharp zoning pattern in disseminated chalcopyrite mineralization to values that exceed .20 percent copper. Extensive oxidation and oxide copper mineralization characterize the brecciated granite at Ripsey Wash indicating the probability that oxide copper and/or chalcocite mineralization occur in the concealed alteration system at depth. The Riverside and Wooley breccia pipes have been structurally rotated to a sub-horizontal attitude and although exterior to the main alteration system, they do indicate that mineralized breccia pipes of interest should occur in the area. Exposures near Ripsey Wash represent an exterior segment of the alteration system that contains veins with interesting gold values and could have potential for a gold-bearing, structurally-rotated, sub-horizontal breccia pipe.

Land:

144 unpatented lode claims owned by Richard Ahern and Russell M. Corn in Secs 15, 21, 22, 27 & 28, T4S, R13E in the Riverside Mining District approximately 8 miles southwest of Ray.

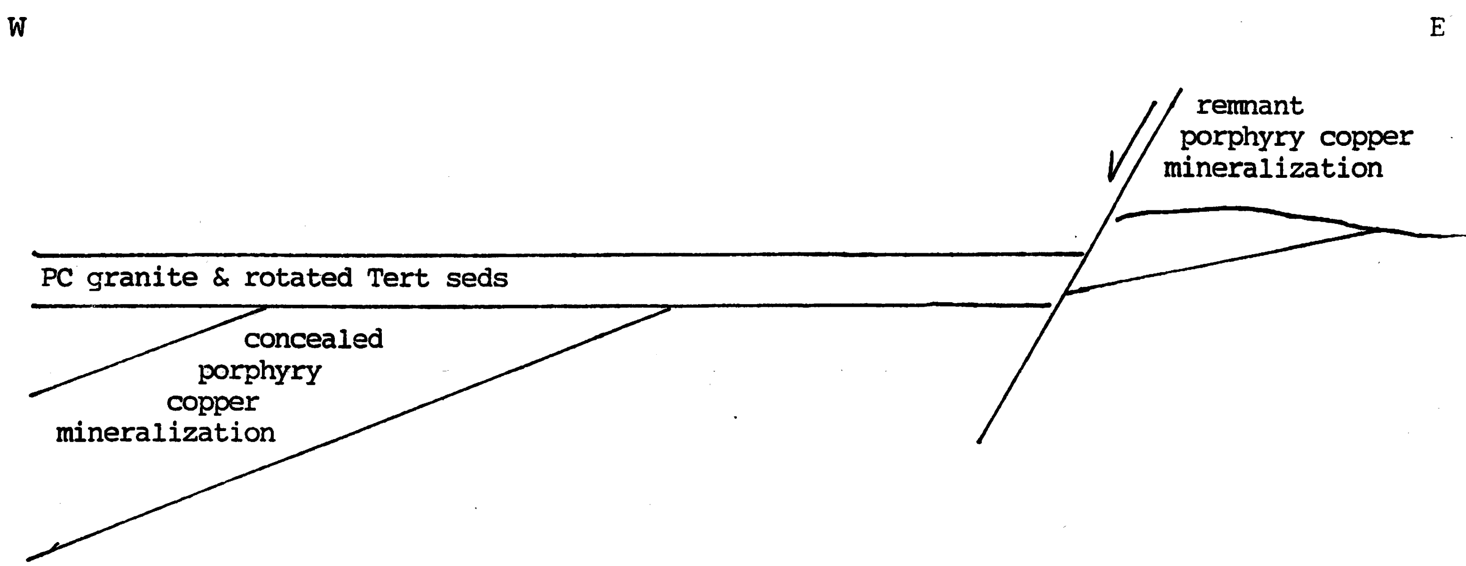
Geologic Setting:

The Kelvin porphyry copper prospect is located at the north end of the Tortilla Mountains in the structurally rotated belt along the west side of the San Pedro Valley that is characterized by near-vertical Paleozoic sedimentary rocks and associated diabase sills. The repeated near-vertical diabase sills on the west side of Ripsey Wash south of the prospect indicate displacement of the porphyry copper alteration system along low-angle faults two to three miles west of the exposures near Riverside.

Previous Exploration:

The chalcocite mineralization near Riverside was explored initially during the 1940's or earlier and since 1960 was drilled by Kennecott and Occidental. In the 1970's Kerr-McGee drilled several holes to the west on down-faulted segments of the alteration system and encountered significant primary copper values beneath unmineralized propylitic altered granite. Gulf Minerals also drilled several holes east of Ripsey Wash and encountered low-angle faults and sheared granite. In 1980 Exxon staked claims and carried out geophysical surveys near the Wooley Breccia Pipe and further south along Ripsey Wash but there is no indication of drilling on the west side of Ripsey Wash except at the Wooley Breccia Pipe.

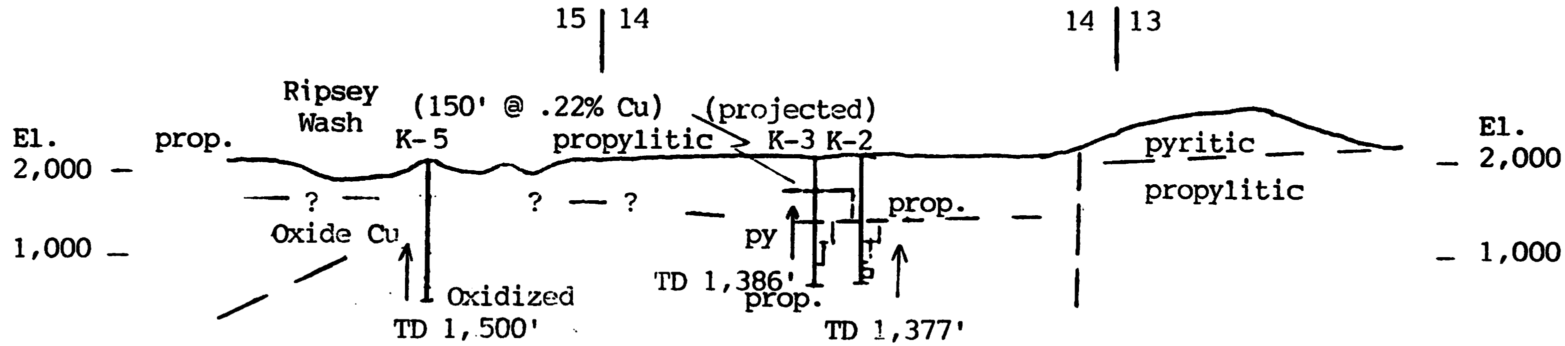
Prepared by R.M. Corn, April, 1992



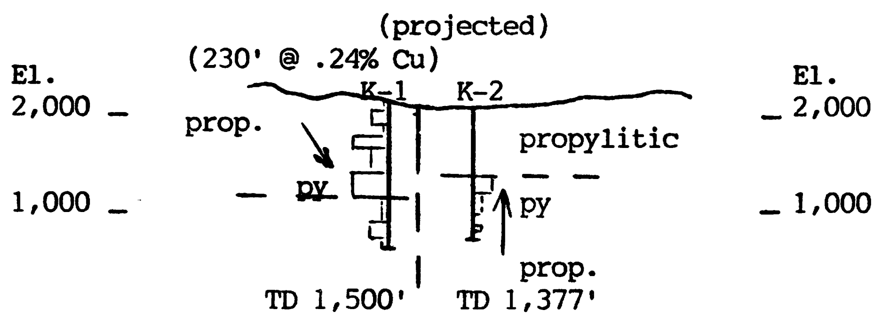
<u>SCHEMATIC DIAGRAM</u>

<u>ILLUSTRATING</u>

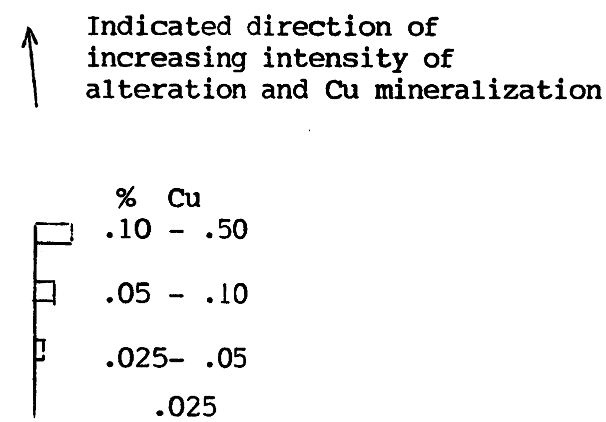
<u>THE DISPLACED AND CONCEALED KELVIN PORPHYRY COPPER SYSTEM</u>



EAST - WEST SECTION THROUGH DRILL HOLES K-2 & K-5



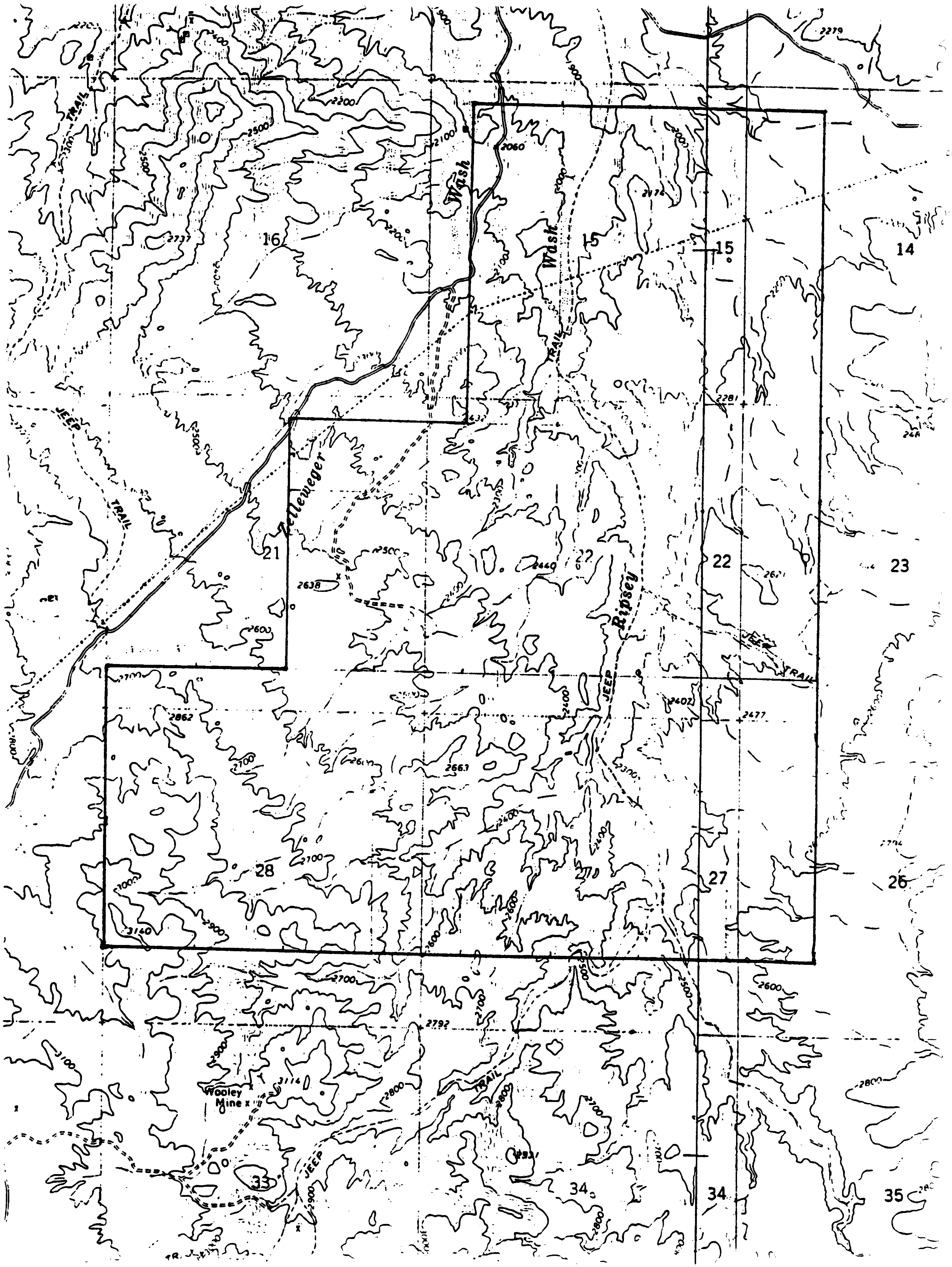
NORTH - SOUTH SECTION THROUGH DRILL HOLES K-1 & K-2



Scale: 1 inch = 2,000 feet
H = V

SECTIONS THROUGH DRILL HOLES AT KELVIN PROSPECT, PINAL COUNTY, ARIZONA

ILLUSTRATING ALTERATION AND COPPER MINERALIZATION



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Mine x
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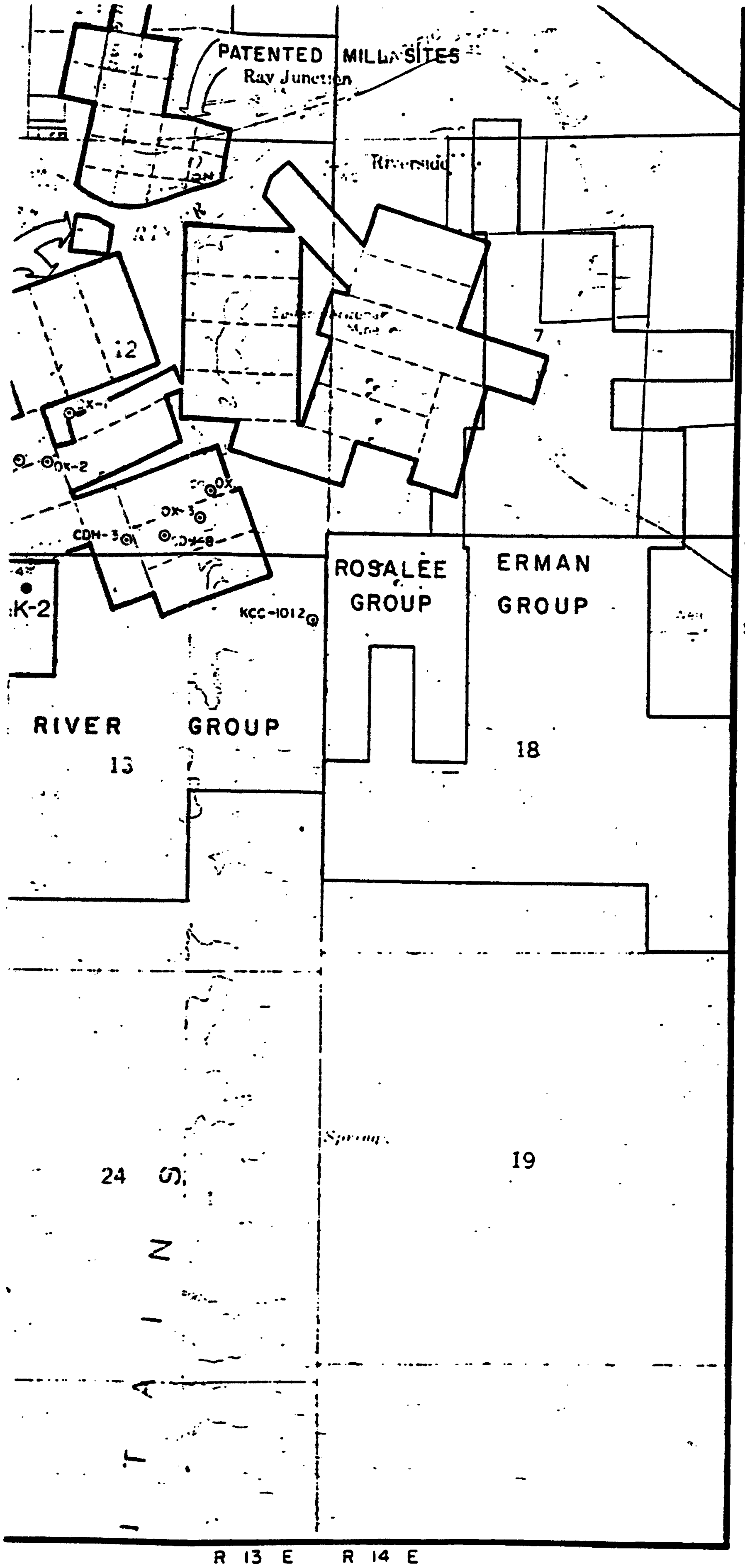
2402
2279

RESULTS OF DIAMOND DRILLING PROGRAM
ON THE
WOOLEY MINE, PINAL COUNTY, ARIZONA.

By: John Dyer

August-September 1974



Kennecott claims

Kennecott patented claims and mi

M.S. and Lucy Wilkins patented cla

Cities Services claims, options, ar

Rosa Lee claim group, approximate

Other deeded lands

DRILL HOLES

K-1 Kerr-McGee diamond drill hole

OX-1 Occidental diamond drill hole

ICC-1 Inspiration drill hole

KCC-1012 Kennecott diamond drill hole

CDH-1 1949 churn drill hole

KE-1 Cyprus diamond drill hole

T-1 Tipperary rotary drill hole

J-3 Johnson rotary drill hole

? Drill hole, party unknown

N

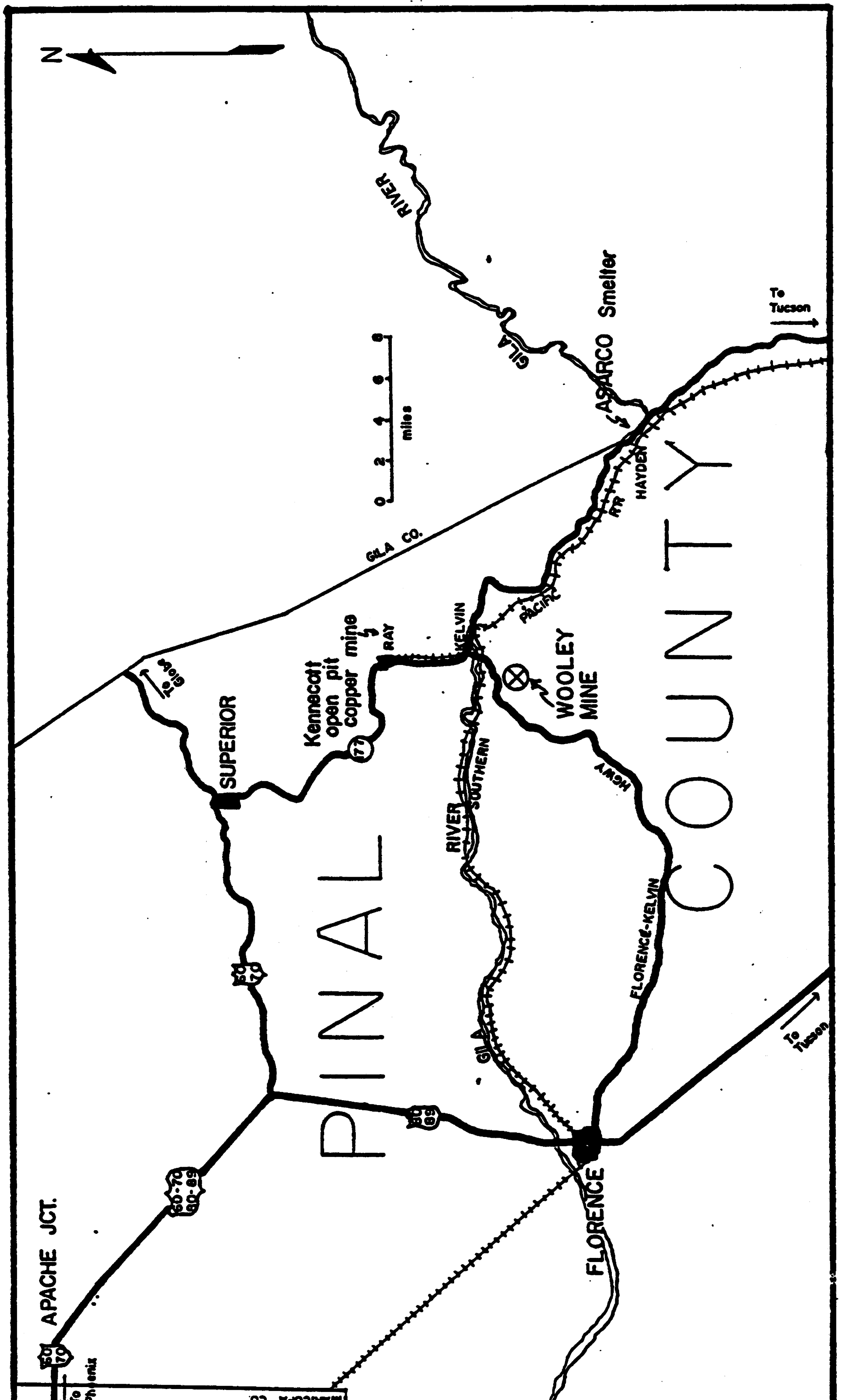
0 2000 4000
Scale in feet

DRILL HOLE LOCATION AND LAND STA
KELVIN PROJECT
PINAL COUNTY, ARIZONA

Gulf Mineral Resourc

BY: J. Wilkins PROJ. NO. TAO

DRWN BY: K.A.C. DATE: Oct. 1977


N
GILA RIVER
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PACIFIC
SOUTHERN
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WOOLEY MINE
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60-70 60-89
60 89
PINAL COUNTY
RIVER
GILA
HGWY
FLORENCE-KELVIN
To Tucson
FLORENCE
APACHE JCT.
To Phoenix
MARICOPA CO.

INTRODUCTION

After a thorough economic evaluation of the San Antonio breccia pipe in Mexico, several things became apparent to the Phoenix staff. Most important of these was the relatively low cost of in situ blasting and leaching as opposed to any conventional mining and milling method. Also of interest was that a relatively small orebody (3-6 million tons) and low grade (0.5-0.8% Cu) could, under certain circumstances, become economic. These conditions were location in the U.S., availability of low cost acid, nearness to railroad and smelter, ore which would leach easily, ore at or near surface, favorable hydrologic conditions, and a low cost option agreement for exploration.

The property meeting most of these conditions was the Wooley property east of Florence, Arizona. T.4S5., R.13E., Sec. 33. (See location map, page 1). This property is located 26 miles east of Florence on a good country road. It is within ten miles of the Southern Pacific railroad at Kelvin. Both the Kennecott Ray Mine and the ASARCO smelter at Hayden are close to the property and both are sources of low-cost acid. Chrysocolla is the dominant copper mineral and is readily leachable. The ore is near surface and has been shown to average around 0.5% Cu by surface and underground sampling (See Haynes Report. Appendix, page 19). Hydrologic conditions appeared to be favorable. A positive recommendation for drilling was given by Mr. Charles Elliot, geophysist, in a report based on Alcoa's previous geophysical work on the property in 1969. (See Elliot Report. Appendix, page 9).

Therefore, only two conditions were needed to test the property completely. One was the negotiation of a low-cost agreement with the owner, Mr. M.V. Deen, et al, and the diamond drilling of three exploration holes to prove both the tonnage and the type and grade of copper minerals present. The first of these was solved by Mr. C. Haynes who negotiated a contract (See option agreement, Appendix, page 1) which required no money except for the 1973 assessment work which would be fulfilled by preliminary dozer work in preparation for drilling. The other condition was fulfilled by contract with E.J. Longyear Company for a diamond drill to be used in the drilling program.

In view of the favorable conditions present at the Wooley, an active exploration program was undertaken to make a complete economic evaluation.

WORK PERFORMED

Preliminary work consisted of improvement of the 1 mile access road from the Florence-Kelvin county road to the property. Five drill pads were prepared and all existing roads over the property were graded and repaired.

On August 13, 1974, a Longyear diamond drill rig arrived at the drill site. Drilling began shortly thereafter and was completed September 11th. A total of 696 feet of diamond coring was done in a series of three holes, (A discussion of each hole will be presented later in the report). Core recovery was excellent considering the broken nature of the breccia and was considered to average around 98%. Circulation was maintained throughout the drilling as the highly fractured rock had been resealed or healed by the abundant quartz.

A general re-mapping and sampling was carried on prior to, and during the drilling. A new geologic map was prepared with information gained from more detailed work than that previously performed. (See Benedict Report. Appendix, page11) all new roads and drill hole locations were added to the revised map.

Two covers were constructed to place over both the 500 foot shaft and the 62 foot shaft on the western end of thebreccia. These were deemed necessary to prevent injury to both human and animal life in the area; also for liability reasosn which are obvious.

DISCUSSION OF DRILL HOLES

As noted previously, a general discussion of the geology and mineralology of the individual holes will be presented here.

HOLE DDH WM-1

The first hole was drilled more or less in the central portion of the breccia. The hole was located to determine the dip of the breccia, depth to the bottom of the breccia, and the type and grade of copper mineralization as correlated with the sampling results from the main adit to the northeast.

Mineralization in hole DDH WM-1 consisted of Chrysocolla with very minor malachite and both black and red copper oxides after what is beleived to have formerly been Chalcopyrite. Weathering and alteration were variable from strong to relatively mild. Much of the rock was broken down to clay. Nearly all copper values were found within the quartz veins which had originally been the solutions by which the copper was introduced. into the breccia.

The average grade of the 222 feet was 0.21% copper. A section from 105-170, (65 feet), produced an average grade of 0.39% Cu. As the bottom of the breccia was encountered at 166 feet, the copper values were found to decrease sharply. (See Assays, Appendix, page24). All samples were taken in 5 foot intervals. Siderite is an accessory mineral.

HOLE DDH WM-2

This hole was drilled in the western portion of the breccia near the angle hole previously drilled by Anaconda. Although Anaconda had drilled nearby, there were several reasons for the location of the hole, One was no information from Anaconda's hole, but rumored to run .02-.03. Two, Anaconda's hole was an angle hole (60°) across the structure with no depth information; and Three, having been drilled in the mid '50's when copper was much less valuable than now, would have been understandably been "walked-away" from. Hole DDH WM-2 was drilled to a depth of 338 feet. This was the most continuously mineralized hole drilled. The main mineral was Chrysocolla with minor malachite. Of importance was the extreme abundance of red and black oxides which are the end result of leached Chalcopyrite. Siderite is common. There was excellent quartz veining with crystals lining the open vugs. Most mineralization was limited to the quartz veins, but minor amounts were found in fractures in the surrounding granite.

The average grade for hole DDH WM-2 was 0.20% Cu. Although there were good zones of mineralization, the barren or weakly mineralized zones produced a poor average grade. All sampling was on 5 foot intervals and it should be noted that there was a decrease in Cu values as the contact between the breccia and underlying granite was reached. The breccia bottomed at an irregular contact at 326 feet. As copper mineralization was nil no assaying form 332-336 was necessary.

HOLE DDH WM-3

The final hole was drilled to determine the thickness and amount of Cu mineralization present on the southerly dipping breccia structure. The hole was located near the SW boundary of the breccia as appears on surface. The hills to the south have the breccia covered in that direction. Due to poor mineralization and futility of more drilling, hole DDH WM-3 was stopped in breccia at 138 feet.

Although the breccia in the hole contained more fracturing, quartz, and siderite than either of the other two holes, the amount of Cu mineralization was much lower. There was an apparent lack of leached former sulfides and little to no Chrysocolla presnt in the abundant quartz veins present. The average grade for the hole was .095% Cu. Perhaps with depth this could have improved, but not likely. All samples were in 10 foot intervals.

DISCUSSION OF DRILLING RESULTS

Even though a minimum amount of drilling was done, several facts concerning the nature of the breccia and it's economic possibilities became apparent. It is believed that due to the following findings and interpretations, that the Wolley breccia can be eliminated from the list of "hopefuls" for an economic copper orebody, They are:

(1) Limited lateral and vertical extent of breccia. As previously shown by surface mapping by Alcoa geologist and geophysical mapping by C. Elliot, the boundaries of the breccia were more or less predicted. Drilling has proven this prediction correct. The breccia ends at a depth of near 300 feet. (Hole DDH WM-2). Therefore tonnage is restricted and there is no deep target.

(2) Distribution of copper mineralization. From a rather thorough study of the core the following hypothesis are made.

A. Copper mineralization decreases south of breccia outcrop. In other words in the direction the breccia dips.

B. The copper occurs predominately within the quartz veins and therefore would have to be blasted to a point of pulverization to allow the acid access to the copper for leaching.

C. The Precambrian granite underlying the breccia shows no copper mineralization and is highly fractured and jointed. Any attempt to recover pregnant copper solutions below the breccia would be impossible.

D. The increase in siderite, unmineralized quartz veins, and decrease in previous sulfides, all in a down dip or southerly direction suggest that the initial high grade portion of the orebody was in the northern 1/2 of the breccia zone which even if the Chalcopyrite still remained, the tonnage would be so low as to make mining impossible. Note: If all previous sulfides were Chalcopyrite the initial grade was probably around 2% Cu before leaching.

CONCLUSIONS

As a result of the drilling on the Wooley, it can be said that there is not an economic orebody presnt. There is little or no chance for any increase in tonnage or grade and only a "fantistic" jump in the price of copper could make the property of any interest to Alcoa in the foreseeable future

Thus, no future work is planned for the Wooley property and the claims have been returned to Mr. M.V. Deen.

All core, assays, reports, drill logs, cross-sections, and related work concerning the Wooley property will be presented to Mr. M.V. Deen in the form of a copy of this report. Mr. Deen's assistance and cooperation throughout the project is greatly appreciated by the author. Also appreciated is drafting assistance by Alcoa geologist D. Soper and field assistance by Alcoa's C. Haynes and M. Hollingsworth.

APPENDIX

APPENDIX

EXPLORATION AND OPTION AGREEMENT

THIS AGREEMENT is made by and between M. V. DEEN and his wife, ROSA LEA WYVONNE DEEN, RONALD R. DEEN and his wife, RUBY MARLENE DEEN, and TOMMY E. DEEN ("Deens"), and ALUMINUM COMPANY OF AMERICA, a Pennsylvania corporation qualified to do business in Arizona ("Alcoa").

1. Deens represent and warrant to Alcoa that except for paramount title of the United States, Deens own twelve (12) unpatented lode mining claims situated in Riverside Mining District, County of Pinal, State of Arizona, named and recorded as follows:

Wooley Mine Lode, Location Certificate recorded in the records of said County, Book 56, Page 8

Wooley No. 1 Lode, Location Certificate recorded in the records of said County, Book 56, Page 8

Wooley No. 2 Lode, Location Certificate recorded in the records of said County, Book 5, Page 430

Wooley No. 3 Lode, Location Certificate recorded in the records of said County, Book 56, Page 40

Wooley No. 4 Lode, Location Certificate recorded in the records of said County, Book 57, Page 401

Wooley No. 5 Lode, Location Certificate recorded in the records of said County, Book 57, Page 401

Wooley No. 6 Lode, Location Certificate recorded in the records of said County, Book 57, Page 402

Wooley No. 7 Lode, Location Certificate recorded in the records of said County, Book 57, Page 402

Wooley No. 8 Lode, Location Certificate recorded in the records of said County, Book 57, Page 403

Wooley No. 9 Lode, Location Certificate recorded in the records of said County, Book 57, Page 403

Wooley No. 10 Lode, Location Certificate recorded in the records of said County, Book 57, Page 404

Wooley No. 11 Lode, Location Certificate recorded in the records of said County, Book 57, Page 404;

that Deens' title to the claims is free and clear of liens and encumbrances; that the locations of the claims have been completed in compliance with the laws of the State of Arizona and of the United States; that Deens have performed or caused to be performed all assessment work required by law to maintain title to the claims and that sufficient affidavits of performance thereof have been properly recorded through the annual assessment year ending September 1, 1973; and that Deens have the full right, power and capacity to enter this Agreement on the terms set forth herein.

2. Alcoa agrees to do the annual assessment work on the above claims for the annual assessment years ending September 1, 1974, and September 1, 1975, in the event that Alcoa exercises the option herein granted, Alcoa agrees to perform annual assessment work required to maintain the above-mentioned claims and to record or furnish to Deens affidavits of such performance for any assessment year in which this Agreement has not expired or been terminated prior to three (3) months before the end of such assessment year. Alcoa shall not be liable on account of holdings of any court or governmental agency that the work elected and performed by Alcoa does not constitute the required annual assessment

work for purpose of preserving title to such claims, provided that the work so done is of the kind generally accepted as assessment work and that Alcoa has expended a total amount sufficient to meet the minimum requirements with respect to all of the claims.

3. Deens hereby grant to Alcoa the sole and exclusive right for a term of eighteen (18) months from the effective date hereof ("the Exploration Period") to enter upon and take possession of the claims, with the right to drill and excavate such holes, pits, shafts and other excavations and to conduct such surveys, explorations, sampling, investigations, and other operations in such manner and to such extent as Alcoa in its sole judgment and discretion may deem advisable, for the purpose of ascertaining any and all facts relating to the occurrence of ores and minerals in and under the property and to the mining, milling and treatment thereof. Except as to such ores as may be shipped for metallurgical testing, bulk assaying, or for other purposes of testing the feasibility of the mining, milling and treatment thereof, Alcoa shall not sell or ship any ore from the property prior to exercise of its option to purchase as hereinafter set forth.

4. During the Exploration Period, Alcoa shall cause not less than five hundred (500) feet of core drilling to be done.

5. At any time during the Exploration Period, Alcoa shall have the exclusive right to purchase the above-mentioned claims together with such right as Deens may have to use, manage and control the water on and in the above-mentioned claims, and the water rights appurtenant to said claims, and together with all and singular, the mines and minerals within the lines of said claim, their dips, spurs and extralateral rights, and all dumps, severed ore, fixtures, improvements, rights and appurtenances.

6. The purchase price to be paid to Deens by Alcoa, in the event that Alcoa shall exercise the option hereinabove granted, shall be the sum ot One Million Dollars ($1,000,000), which purchase price shall be paid only from ore produced from the above-described claims, Alcoa paying to the Deens five per cent (5%) of the net smelter returns, as hereinafter defined, from said ore; provided, that the minimum monthly payment shall be Four Hundred Dollars ($400), beginning with the month after the month in which Alcoa shall exercise the option hereinabove granted, and ending when all of the sums paid by Alcoa to the Deens on account of the purchase price shall aggregate One Million Dollars ($1,000,000), or when Alcoa at its sole option shall reconvey the claims to the Deens, whichever shall be earlier.

7. Net smelter return, as used in this Agreement, means the amount of payments received by Alcoa from the smelter or other buyer to which any ore or concentrates produced from the

premises are delivered for treatment and sale, after deduction has been made of all smelter and treatment charges, and actual freight and cost of transportation and haulage from the premises to the smelter or other buyer, less taxes, if any, levied and paid upon the production thereof, not including Federal income tax. In the event Alcoa shall process the ore and use it, without selling it, net smelter return shall mean the market value of the copper recovered by Alcoa from the ore, computed by multiplying the number of pounds of copper recovered by Alcoa times the average price per pound of domestic producers' electrolytic wirebar copper as reported in the American Metal Market for the period in which the ore is processed by Alcoa, less all smelter and treatment charges and expenses, freight and cost of transportation and haulage from the premises to the smelter or other processing location as limited above, less taxes, if any, levied and paid upon the production thereof, not including Federal income tax.

8. If this Agreement is terminated, Alcoa, upon request given by Deens within thirty (30) days of said termination shall furnish Deens within a reasonable time thereafter copies of all factual maps, drill logs, and any other factual data pertaining to the claims prepared by Alcoa. Alcoa agrees that, as to any core from the claims retained by Alcoa after termination of this Agreement, said core shall be delivered to Deens within thirty (30)

days. In no event shall Alcoa be liable to Deens for the loss or destruction of core from the claims.

9. If, in the opinion of counsel for Alcoa, Deens' title to any -f the claims is defective or less than as warranted in paragraph 1 hereof, Alcoa may deliver to Deens written notice stating its objections to the title and if Deens are unable or unwilling to promptly correct the defects in title, Alcoa may attempt, with all reasonable dispatch, to perfect the title. In that event, Deens shall execute all documents and shall take such other actions as are reasonably requested by Alcoa to assist Alcoa in its effort to correct the defects in title. All costs and expenses of perfecting title, including, may not limited to, amounts paid at Alcoa's discretion in settlement of dispute of claims, the costs of attorneys' fees, and the cost of releasing or satisfying mortgages, liens and encumbrances shall be a credit against payments thereafter to be made under this Agreement.

10. Alcoa shall have the right, but shall not be obligated in any way, to amend or relocate any of the above-mentioned claims which Alcoa, in its sole discretion deems advisable to so amend or relocate. Such amendments or relocations shall be made in the name of Deens and the location notices may be signed by Alcoa or its agent as agent for Deens. It is understood and agreed that the work performed by Alcoa or its agents in connection with the amendment or relocation shall be done in a good and miner-like

fashion and at the sole cost and expense of Alcoa. Upon request by Alcoa, Deens shall apply for a patent to any of the unpatented lode mining claims so designated by Alcoa and shall execute all the necessary applications and documents in connection therewith, and shall cooperate fully with Alcoa in securing such patents. All expenses incurred or authorized by Alcoa in connection with such patent proceedings shall be borne by Alcoa. Such expenses shall be deducted from the purchase price to be paid under this Agreement. The rights of Alcoa under this Agreement shall extend to any of the amended, relocated or patented mining claims.

11. Any new claims staked by Alcoa, any portions of which lie within two (2) miles from any point in the above-described claims, whether located in the name of Deens or in the name of Alcoa, shall become subject to the terms and conditions of this Agreement, and upon termination of this Agreement, Alcoa agrees to quitclaim any such claims to Deens. If Deens own or hereafter acquire any land or mineral rights, any part of which lies within two (2) miles of any point in the above-described claims, such lands or mineral interests shall become subject to the terms and conditions of this Agreement, and the parties agree to execute whatever documents are reasonably necessary to evidence the inclusion ot such lands or mineral interests.

12. The parties to this Agreement shall execute and record a memorandum ot this Agreement in the form attached hereto as Exhibit A.

13. Any notice required to be given to Deens hereunder shall be given by certified or registered mail, return receipt requested, addressed as follows:

Mr. Ronald H. Deen
State Route Box 128
Riverside, Arizona 85237

and any notice given to Alcoa shall be given by certified or registered mail, return receipt requested, addressed as follows:

Aluminum Company of America
Alcoa Building
Pittsburgh, Pennsylvania 15219

Attention: Raw Materials Division

Any notice so given shall be deemed to have been validly given upon mailing. The above addresses may be changed by the respective parties by notice given as herein provided.

IN WITNESS WHEREOF, this Exploration and Option Agreement has been executed to be effective as of the 15th day of August, 1974.

M. V. Deen

Ronald R. Deen

Tommy E. Deen

Rosa Lea Wyvonne Deen

Ruby Marlene Deen

ALUMINUM COMPANY OF AMERICA

By____________________
Vice President

[illegible]
Mining Geophysical Engineers
4653 EAST PIMA STREET TUCSON, ARIZONA 85712 TEL. (602) 798-2421

April 23, 1974 Ref: AL4E

Mr. W.J. Colegrove
Aluminum Company of America
Western Exploration Office
P.O. Box 10456
Phoenix, Arizona 85016

Re: Wooley Mine Project, Pinal County, Arizona

Dear Cougar:

As requested by you, I have reviewed all of the available data in my files pertaining to this project including my own report on the ground magnetic, induced polarization, and resistivity results, dated June 13, 1969. This review, as requested by you, is based on the premise that the breccia pipe, even though it may be of only moderate dimensions, could conceivably contain sufficient oxide copper mineralization to make an in situ leaching ore body. This premise differs grossly from previously in that the geophysical programs were basically performed in the search for deep, larged disseminated sulfide bodies that might have been in association with the small breccia pipe located at the Wooley Mine.

All of the induced polarization-resistivity data by Geoscience, Inc. and Canadian Aero Mineral Surveys with the exception of two special lines, Lines C-7 and C-8 by Canadian Aero Mineral Surveys, were for the purpose of deep exploration for large porphyry copper type deposits. On the other hand, Lines C-7 and C-8 with a short dipole length (200 feet) were surveyed for the purpose of mapping in detail the Wooley Mine breccia pipe. In addition, the staff of ALCOA performed ground magnetic lines again as a means of possibly mapping the lateral extent of the breccia pipe. The ground magnetic data in no way reflects the depth of the pipe, but did indicate a subtle expression of the contacts of the breccia pipe with the host rock.

In addition, Canadian Aero Mineral Surveys Lines C-7 and C-8 indicated that the breccia pipe may have a subtle electrical signature consisting of a slight increase in induced polarization response and a slight decrease in resistivity. Both of these subtle electrical indications, suggest that the main breccia pipe has an indicated bottom depth less than 300 feet. More properly, as was originally stated in my report of June 13, 1969 the controlling mineralization that may be effecting the electrical physical properties of the pipe, changing form or intensity at or above 300 feet. Thereby, the breccia structure itself may possibly extend to a greater depth.

CHARLES L. ELLIOT REGISTERED PROFESSIONAL ENGINEER

There was no major sulfide deposit in association with the breccia pipe as interpreted in the original data, but that the breccia pipe was roughly delineated horizontally and vertically. The original conclusion that the pipe needed drill testing still stands and is basically the prime conclusion today even in view of the new premise.

I totally agree with my previous general conclusions. I would like to emphasize at this time that the interest is now the extent of the breccia with depth that the magnetic and electrical effects noted in association with the breccia pipe are very subtle features and therefore the interpretation of them could be severely inaccurate or grossly misleading. Thereby, reliance on the existing geophysical work is possibly not without some degree of uncertainty. In view of the subtleness of the geophysical responses, no additional geophysical work is warranted or recommended.

My original recommendation to drill the pipe still stands and is emphasized in view of the current economic premise. This property and particularly the oxide mineralized breccia pipe cannot be written off nor emphasized on the basis of the geophysical work alone. Drill testing is necessary and strongly recommended.

Respectfully submitted,

ELLIOT GEOPHYSICAL COMPANY

Charles L. Elliot

Charles L. Elliot

Registered Professional Engineer (Geophysical) Certificate No. 6877 Charles L. Elliot 4-23-74 Arizona U.S.A.

CLE:nd

WOOLEY MINE, RIPSEY DISTRICT

PINAL COUNT, ARIZONA

ABOUT 5 MILES, AIRLINE, S.W.
OF KELVIN, ARIZONA

BY

P.C. BENEDICT

APRIL 23, 1953

(New typed copy)

CONTENTS

APPENDECIES

MAPS HEREWITH

April 23, 1953

Mr. Fred Searls, Jr.
Newmont Exploration Limited
Room 1501, 14 Wall Street
New York, New York

Dear Fred:

Re: Wooley Mine, Ripsey Dist.
Pinal Co., Arizona. About
5 miles airline S.W. of
Kelvin, Arizona

FORESTATEMENT

Ken McGriffin and R.J. Searls briefly inspected this property and recommended I take a look which I did, spending about 3/4 day on it, in company with Mr. Leo Wall the owner, on March 27th.

Attached hereto are exerpts from the undated report of Henry W. Nichols, an engineer who formerly worked in the Magma assay office and was one the the Vendors of San Manuel. Hugh Steels tells me that his sampling, as shown on accompanying Plate W-2, can be accepted 100%.

I accept Nichols' report except insofar as the following statements may differ from same.

RECOMMENDATIONS

I recommend that we do no work on this property. However, Mr. Leo Wall, the owner, contemplates doing some diamond drilling and I have indicated to him in reply to his querry, that I should be interested in reviewing the results therefrom and that, should they be favorable, we might well be interested in optioning the property and prosecuting a vigorous development campaign.

GEOLOGY

The outcropping rock is fine grained pre-Cambrian granite. It is the type classified as 4 in R.B. Hargraves report on the Tortilla Mts., South of Kelvin. To the N.W. of the big wash shown on W-2 is coarse grained granite (Hargraves type 1.)

The "felsite" dikes shown by Nichols are fine grained diabase and pre-mineral. If, as seems probable, the diabase is Laramide in age, the mineralization may also be so classified.

MINERALIZATION

The area shown on W-2 as "orebody is a breccia pipe. I get the impression that solutions entering along fractures and cracks have dissolved irregular eliptical holes and irregular tabular cavities in the granite; that the limited amount of brecciation is due to slumping into such holes. These holes have subsequently been lined with radiating, Euhedal quartz crystals and between the crystal terminations black (manganiferous?) calcite has been deposited and, in some of the, coarse blebs of sulphide.

All exposures are completely oxidized. On surface the calcite is completely dissolved out but the limonite, where present, remains as discrete blebs. Transportation of iron has been negligible and there is no general discoloration of the rocks. Limonite is usually accompanied by chrysacolla staining which has travelled a maximum of a few inches from the limonite source. No disseminated sulphide was deposited in the rock between the "geodes".

In the two tunnels, the black to brownish calcite remains in a few places. Where leached the quartz crystals are frequently covered with a little black dust which I interpret as being residual manganees oxide relicit after the black calcite.

Some of the residual limonite masses suggest pseudomorphs after coarse pyrite cubes, and their preservation, with so little transportation, is probably largely due to the calcite that once surrounded them. However, some copper sulphide was certainly present.

The size of the mineralized area is shown reasonably correctly on W-2 though it contains:

(1) Substantial areas in which the quartz pockets are sparce or lacking.

(2) Substantial areas in which the quartz pockets and stringers show no limonite and/or copper stain.

By and large the better mineralized areas have a tendency to outcrop strongly, sometimes as pinnacles, Quartz pockets and very sparce limonite blebs can be found im areas of poor outcrop but the best mineralization is undoubtedly in some of the pinnecles shown, particularly in that at the collar of the 500 foot shaft.

In this latter locality there is sufficient limonite that, iit if represented chalcopyrite principally, it might account for about 2% Cu for a small area. On the other hand it is my belief that, according

MINERALIZATION - continued

to the surface showings, if the limonite represented mostly chalcopyrite, not more than 1/3 of the area shown as "orebody" on W-2 would average 0.4% copper and another third would average something like 0.2% and the remainder substantially less.

It may be that, but little copper has been transported away and that the sampling of the completely oxidized tunnels gives a fairly representative notion of the amount of copper originally present at that elevation.

There is, of course, the optimistic possibility that primary grade might increase repidly with depth.

THE 500' SHAFT

The shaft dump shows no sulphide and almost none of the quartz "breccia" mineralization. Where the adit level intersects the shaft it may be seen:

(a) The irregular, more or less gradational, north boundary of the "breccia" is about 50' north of the shaft.

(b) At the shaft there are three faults cutting one another and together making up a broken zone about 15' wide which represents bad ground and, for some reason which I do not understand, shows very little of the quartz "breccia" mineralization. One of these faults is approximately vertical and is doubtlessly the same one that forms the north boundary of the "breccia" in Tunnel #2, 600' to the west. See W-2 The other two faults dip 75° to 80° southerly.

The barrenness of the dump may be due to any of the three following reasone:

(1) The shaft stayed in this crushed fault zone which, where exposed in Tunnel #1, is barren. The fineness of the material in the dump supports this possibility.

(2) The breccia zone dips southerly and the shaft went into its footwall.

(3) The breccia pipe bottomed above the bottom of the shaft.

Accepting either (1) or (2) carries with it the corallory that no appreciable crosscutting was done from the bottom of the shaft. You

THE 500' SHAFT - continued

will note from Nochols' report that even hearsay information about this shaft is scanty. Such as is available suggests the possibility that the shaft caved before any crosscutting off its bottom was possible.

The government township plat shows both the Wolley Mine and Mill. The township was surveyed in 1922 and I would suppose there must have been some relic of the mill building at that date. There is no trace of any buildings on the property today and I say no tailings though they could, of course, have been washed wasy. Many a mill had been built without any ore. Nevertheless the fact that there was a mill suggests that some sulphide may have exposed somethwer. Nochol's history is very vague,but can be read to mean that there was crosscutting from the shaft either at the 200' level or somewhere between there and the bottom at 500'. If so, such crosscutting may have shown the "abundance of low grade Ire" (which seems to be attributed to Matt Davis) and this <u>may</u> have been sulphide, <u>may</u> have been treated in the mill and this <u>may</u> explain the complete absence of sulphide on the shaft dump.

SECONDARY ENRICHMENT

Between 1/2 and 3/4 miles to the east and at a considerably lower elevation is the west boundary of the Gila conglomerate dipping easterly somewhat more steeply that the intervening topography. It is conveivable that the abse of the Gila may have once been not many hundreds of feet above the Wooley outcrop. I so there is a possibility that enrichment related to the base of the Gila could be preserved.

On the other hand calcite appears to have been more abundant than sulphide, Kaolinization of the granite is not discernible, and there probably never has been any very important secondary enrichment.

OWNERSHIP

Mr. Leo Wall, Box 144, Ray, Arizona. Mr. Wall lives just east of the Kelvin highway and south of the golf course about 1 mile or so southerly from Ray.

Yours very truly,

P. C. Benedict

PCB:mr

cc: A.A. Brant

COPY **SMITH-EMERY COMPANY**

ESTABLISHED 1910
CHEMISTS - ENGINEERS
METALLURGICAL AND TESTING ENGINEERS
781 EAST WASHINGTON BOULEVARD
LOS ANGELES 21
CALIFORNIA

LABORATORY
No. 422327

Date July 21, 1956

Sample Pulp

Received 7-19-56

Marked "R.S-C Sample No. 1351"

Submitted by Arizona Assay Office,
P. O. Box 1148,
Phoenix, Arizona.

REPORT OF QUALITATIVE SPECTROGRAPHIC EXAMINATION

Element	Approximate Quantity
Silicon, Aluminum, Calcium	Major Constituents.
Iron, Magnesium, Sodium, Potassium	Intermediate Constituents.
	Minor Constituents
Titanium	1%
Manganese	0.1%
Barium	0.05%
Strontium	0.05%
Copper	0.01%
Vanadium	0.01%
Zirconium	0.01%
Gallium	0.005%
Chromium	0.005%
Nickel	0.001%
Cobalt	0.001%
Lead	0.001%
Boron	0.001%
Tungsten	None found
Rare Earths	None found

Respectfully submitted,

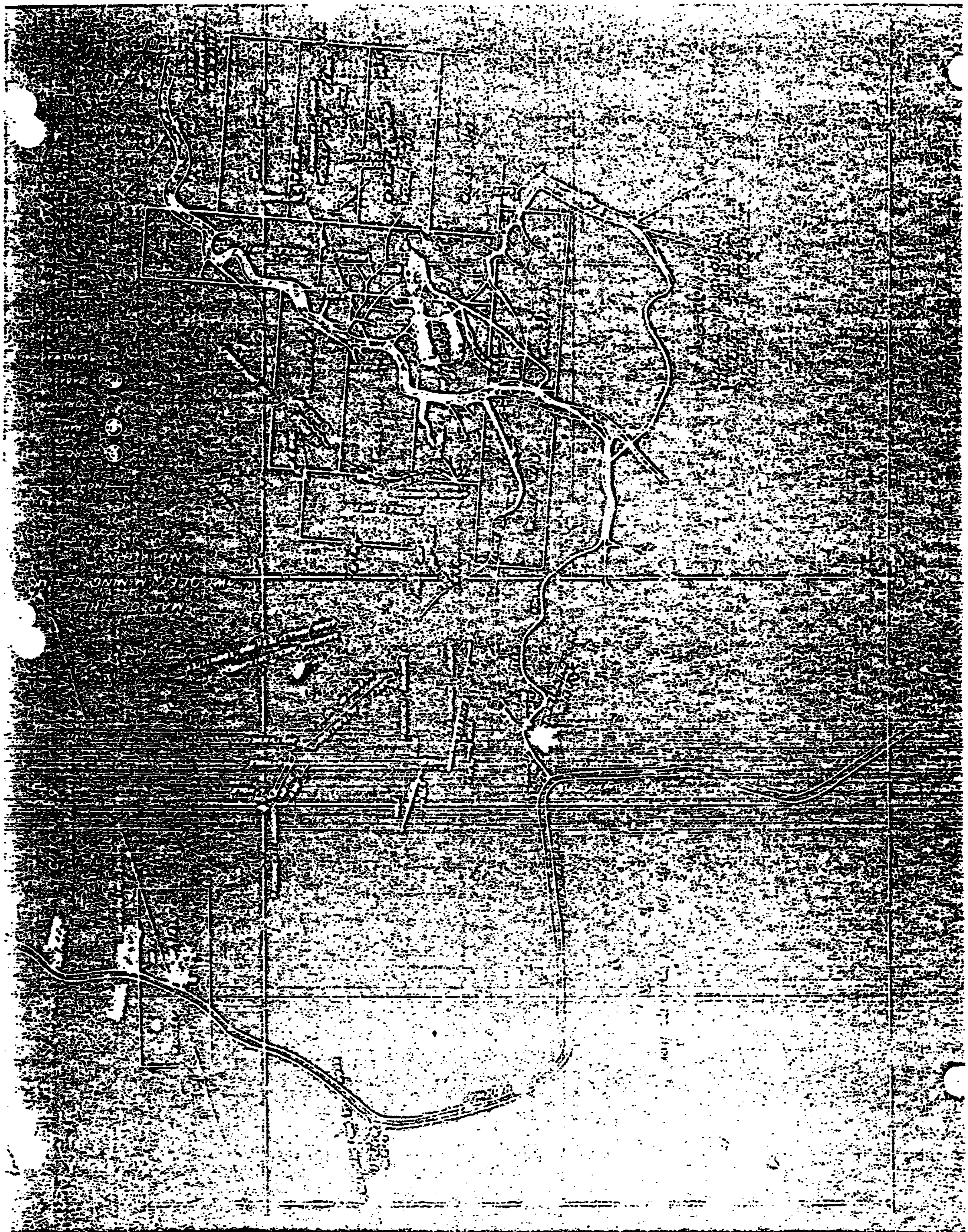
Smith-Emery Co.

CHEMISTS AND ENGINEERS

G.L.C.

All reports are submitted as the confidential property of clients. Authorization for publication of our reports, conclusions, or extracts from or regarding them is reserved pending our written approval as a mutual protection to clients, the public and ourselves.

(See statements on reverse side regarding qualitative spectrographic examination)



FROM C. W. Haynes

Phoenix Office

TO G. C. McBride

Pittsburgh Office

June 26, 1974

RE: THE WOOLEY MINE COPPER PROSPECT, PINAL COUNTY, ARIZONA

SUMMARY

The Wooley Mine is a copper prospect in a breccia structure. It may make a profitable operation if expenditures are kept to a minimum and copper can be extracted by in situ blasting, leaching and iron precipitation. Anticipated reserves are three million tons at 0.5% Cu. Its geology, location in Arizona. closeness to smelters, acid supply and rail transportation are very favorable factors. Also the cost of obtaining the land is very favorable. Diamond drilling three holes would cost about $25,000 and will give an indicated tonnage and grade. Metallurgical testing of the core will indicate if the copper is recoverable in sufficient quantities. A feasibility study would show if the program should be dropped or continued. If continued, additional funds would be requested to complete the evaluation. Although the property might be marginal, its location in the United States may be more important than economic factors.

HISTORY OF EXPLORATION

Old diggings abound in the region, some dating back to the late 1800's. Copper was the main ore sought, due mainly to the operations at Ray. The main mine openings are: the East Shaft, reportedly 500 feet deep, but caved just below the Adit Level; the East Adit, driven in a S 30 E direction, exposes the brecciation for its entire width at that location;the West Shaft, approximately 50 feet deep; and the West Adit, which was driven on a S 10 W bearing, but not completed to the southern boundary of the brecciation. Both shafts were sunk on post-mineral faults that bound the breccia structure on the northern side. Anaconda is reported to have drilled two diamond drill holes in the mid to late 1950's that averaged two or three-tenths copper. Freeport Sulfur did surface and underground sampling and mapping and ran an I.P. survey. Alcoa did underground sampling and surface magnetic and I.P. surveys. Recently Kennecott is reported to have conducted successful leaching studies. All the work to date indicates a low-grade, small tonnage copper deposit assocaited with a small breccia structure. No underlying sulfide body or zone was detected, either within or away from the breccia.

LAND SITUATION

Twelve unpatented claims, Wooley and Wooley No. 1 through No. 11 cover the area of interest. Another claim, Wooley No. 14, lies about 3/4 of a mile west northwesterly and is separate from the main group. Two other claims, Hidden Tresure No. 1 and No. 2, may be included if we want them. At this time only the twelve listed first are of interest. They lie mainly in the northern half of section 33, T4S, R13E. They are 26 miles east of the Arizona State Prison at Florence, Arizona. The claims are owned by M. V. Deen and sons Tommy and Ronald. Mr Deen receives mail at P. O. Box 879, Winkleman, Arizona, 85292. His phone number is (602) 356-6742. Copies of ownership, claim location notices and affidavits of labor for annual assessment work will be sent to Walt Howarth with a copy of this report.

Alcoa can obtain an option from Mr. Deen by (1) drilling two or three exploration holes and allowing the work to be used for this year's assessment work (due August 31, 1974). We would then be allowed three to six months to actively conduct metallurgical leach studies and preliminary feasibility studies to see if the deposit could be made commerical by solution mining techniques. If these studies are negative Alcoa drops the properties with no cost outlay, but giving Mr. Deen the results of our work. If the studies are affirmative then (2) Alcoa pays Mr. Deen, et al, a negotiable amount of money per month, probably in the $400 to $600 range. These monies are paid until the property is put into production. At that time (3) Alcoa pays 10% of the net smelter return, less transportation, on the copper and any other values recovered. No end price was set and is presumably negotiable. A contract should be drawn up and presented to Mr. Deen at this time.

GENERAL GEOLOGY

The basement rock in the area is Precambrian Oracle granite. It is cut by Younger Precambrain diabase. Paleozoic sediments are absent in this part of the Florence-Ray district. Laramide activity began with the intrusion of quartz diorite which occurs mainly as east-northeasterly trending dikes. This was followed by the Grayback granodiorite. The Granite Mountain porphyry intrusion preceeded the ore fluids that formed the porphyry copper deposit at Ray. Tertiary volcanics completed the intrusive activity.

All the Laramide intrusives show some measure of copper mineralization, usually along their contacts. Northeasterly trending faults, with or without quartz, locally contain copper mineralization. The widespread mineralization coupled with known favorable structures, lineaments, rock types etc., have made the general area popular for exploration during the last few years.

THE WOOLEY MINE AREA

The old adits and shafts previously described are located within or near a small breccia structure. The structure is within Precambrian Oracle granite, cuts Younger Precambrian diabase and may be cut by Laramide diorite dikes. The physical appearance of the diabase, diorite and andesite are very similar on surface and underground. Thin-section work would define this problem and probably give a good age range for the structure. The shape of the breccia is roughly "meat cleaver". The northern boundary is sharp along strong post-mineral faulting, although there is an apparent crackle zone present also. This boundary shows a steep northerly dip on the faults, but the breccia may actually dip southerly overall. The remaining boundaries are generally gradational, but can usually be pin-pointed within several feet. I.P. and ground magnetic surveys conducted by Alcoa in 1969 indicate the breccia could dip steeply to the south.

The fracturing within the breccia is usually healed with quartz. Pyrite and chalcopyrite followed the quartz. No evidence of other primary minerals has been found to date. Leaching and oxidation have produced a range of non-sulfide iron and copper minerals. Chrysocolla seems to be the most prevalent copper mineral. Sampling of surface and underground indicates an average grade of 0.5% Cu for near surface mineralization. With depth the grade could decrease if there has been surface enrichment. It could increase if there has been supergene enrichment. There is some evidence for both cases, but nothing definative. The breccia is very similar to San Antonio in appearance, but much weaker in mineralization. Tonnages could be similar.

TARGET AND RECOMMENDATIONS

The target is three million tons of 0.5% copper that would be exploited by in situ leaching (blasting and solution mining) followed by iron precipitation. During the feasibility studies made on the San Antonio project Hackman and Carwile noted that a deposit of this type might be commerical in the United States under the right conditions. The Wooley deposit meets some of these conditions. Drilling three holes would give an indication of tonnage, grade and shape of the deposit. Hydrometallurgical testing would indicate if recovery of copper is sufficient. DuPont would provide the explosive technique and Harshbarger the hydrogeological control. Additional drilling would give the needed reserve data plus additional material for more hydro-metallurgical tests. A final feasibility study would show if the deposit is commercial.

At this time I recommend obtaining a contract with Mr. Deen et al., for the land, have Longyear drill three diamond drill holes and have Alcoa do hydrometallurgical testing. A preliminary feasibility study would then be made to indicate if further work is indicated. This study is recommended at the end rather than the beginning of the program, because of the large number of variables. At the beginning the variables are so numerous as to negate a study. Following the study we would drop the property or pick up the option.

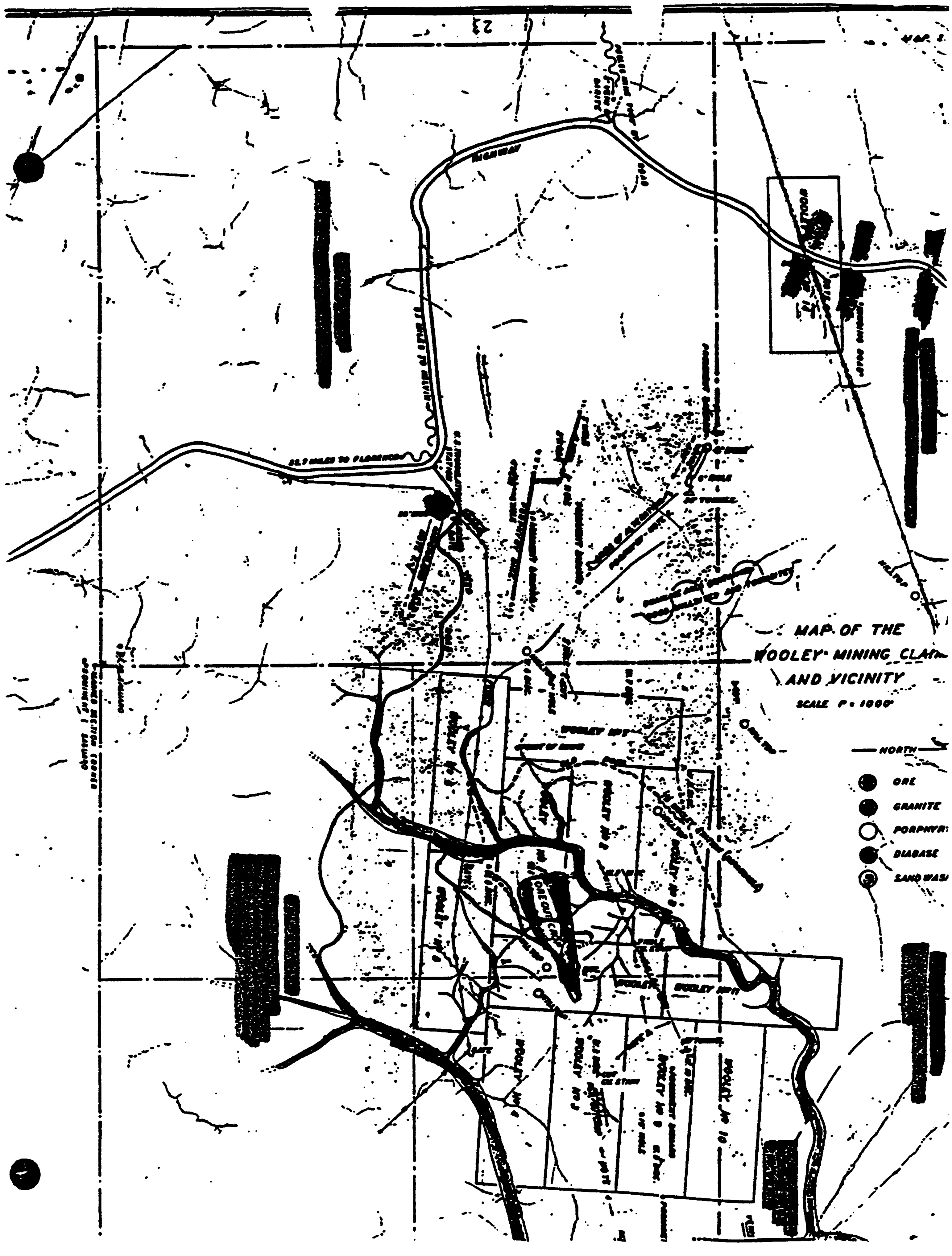
Due to the anticipated low grade the chances are low for a commercial deposit, perhaps 1 in 10. However, we can get an option for the land for no cash outlay. The drilling will probably cost less the $25,000 and be completed in two to three months. The costs for metallurgical and feasibility studies are unknown, but would be done by Alcoa personnel, if available. Therefore, we have a chance for a partial evaluation for $25,000 outlay, which is quite low at today's prices. If this first part is successful then we would be asking for additional funds for drilling, consultants, metallurgical tests, land acquisition etc.

C. W. Haynes

C. W. Haynes

CWH:vg

cc: W. J. Colegrove, Phoenix Office
W. O. Howarth, Pittsburgh Office, (with legal attachments)


MAP OF THE
WOOLEY MINING CLAI
AND VICINITY
NORTH
ORE
GRANITE
PORPHYR
DIABASE
SAND WASH
HIGHWAY
WOOLEY No 7
WOOLEY No 11
WOOLEY No 10

COPPER ANALYSES OF DDH WM-1 CORE

Sample No.	Interval	Copper
1	10-15	0.25%
2	15-20	0.16
3	20-25	0.12
4	25-30	0.30
5	30-35	0.11
6	35-40	0.07
7	40-45	0.14
8	45-50	0.24
9	50-55	0.17
10	55-60	0.16
11	60-65	0.13
12	65-70	0.16
13	70-75	0.14
14	75-80	0.16
15	80-85	0.20
16	85-90	0.21
17	90-95	0.19
18	95-100	0.10
19	100-105	0.07
20	105-110	0.21
21	110-115	0.17
22	115-120	0.39
23	120-125	1.50
24	125-130	0.18
25	130-135	0.12
26	135-140	0.11
27	140-145	0.49
28	145-150	0.31
29	150-155	0.63
30	155-160	0.70
31	160-165	0.15
32	165-170	0.11
33	170-175	0.08
34	175-180	0.06
35	180-185	0.06
36	185-190	0.09
37	190-195	0.10
38	195-200	0.09
39	200-205	0.08
40	205-210	0.11
41	210-215	0.07
42	215-220	0.08

COPPER ANALYSES OF DDH WM-2 CORE

Sample No.	Interval	Copper	Sample No.	Interval	Copper
1	11-16	0.12%	32	167-172	0.23%
2	16-21	0.14	33	172-177	0.27
3	21-26	0.19	34	177-182	0.24
4	26-31	0.11	35	182-187	0.22
5	31-36	0.28	36	187-192	0.17
6	36-41	0.18	37	192-197	0.31
7	41-46	0.18	38	197-202	0.15
8	46-51	0.15	39	202-207	0.22
9	51-56	0.18	40	207-212	0.22
10	56-62	0.30	41	212-217	0.21
11	62-67	0.12	42	217-222	0.20
12	67-72	0.24	43	222-227	0.11
13	72-77	0.16	44	227-232	0.18
14	77-82	0.13	45	232-237	0.26
15	82-87	0.18	46	237-242	0.26
16	87-92	0.20	47	242-247	0.23
17	92-97	0.15	48	247-252	0.13
18	97-102	0.17	49	252-257	0.16
19	102-107	0.13	50	257-262	0.35
20	107-112	0.15	51	262-267	0.43
21	112-117	0.18	52	267-272	0.33
22	117-122	0.12	53	272-277	0.26
23	122-127	0.12	54	277-282	1.10
24	127-132	0.14	55	282-287	0.09
25	132-137	0.34	56	287-292	0.10
26	137-142	0.19	57	292-297	0.05
27	142-147	0.15	58	297-302	0.07
28	147-152	0.11	59	302-307	0.36
29	152-157	0.11	60	307-312	0.15
30	157-162	0.21	61	312-317	0.08
31	162-167	0.21	62	317-322	0.05

COPPER ANALYSES OF DDH WM-3 CORE

Sample No.	Interval	Copper
1	5-15	0.09%
2	15-25	0.13
3	25-35	0.11
4	35-45	0.14
5	45-55	0.10
6	55-65	0.06
7	65-75	0.02
8	75-85	0.03
9	85-95	0.04
10	85-105	0.09
11	105-115	0.10
12	115-125	0.22
13	125-135	0.10

EXPLORATION COST

Longyear Diamond Drilling	$10,859.63
Assays & Laboratory	377.60
Drill Pads & Roads	1,700.00
Materials for Core Shed & Miscellaneous	213.02
Geologist Expenses & Transportation and Miscellaneous Labor	1,195.20
Rent on Core Shed	25.00
TOTAL	$14,370.45

Pages 28-33

WERE NOT PROVIDED

Randolph

430. Eberly, L. D., and Stanley, T. B., Jr., 1978, Cenezoic stratigraphy and geologic history of southwestern Arizona: Geological Society of America Bulletin, v. 89, no. 6, p. 921-940.

Red Hills

53. Arizona Bureau of Mines, 1962, Folio of geologic and mineral maps of Arizona: Tucson, Arizona, University of Arizona, Arizona Bureau of Mines.

430. Eberly, L. D., and Stanley, T. B., Jr., 1978, Cenezoic stratigraphy and geologic history of southwestern Arizona: Geological Society of America Bulletin, v. 89, no. 6, p. 921-940.

436. Elsing, M. J., and Heineman, R. E. S., 1936, Arizona Metal Production: Arizona Bureau of Mines Bulletin 140, Economic Series 19, 112 p.

Ripsev

46. Anthony, J. W., Williams, S. A., and Bideaux, R. A., 1977, Mineralogy of Arizona: Tucson, Arizona, University of Arizona Press, 255 p.

47. Arizona Bureau of Geology and Mineral Technology File data: Tucson, Arizona, Arizona Bureau of Geology and Mineral Technology, 85719.

301. Cornwall, H. R., and Krieger, M. H., 1975, Geologic map of the Kearny Quadrangle, Pinal County, Arizona: U.S. Geological Survey Geologic Quadrangle Map GQ-1188, scale 1:24,000.

319. Creasey, S. C., Jackson, E. D., and Gulbrandsen, R. A., 1961, Reconnaissance geologic map of parts of the San Pedro and Aravaipa valleys, south-central Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-238, scale 1:125,000.

430. Eberly, L. D., and Stanley, T. B., Jr., 1978, Cenezoic stratigraphy and geologic history of southwestern Arizona: Geological Society of America Bulletin, v. 89, no. 6, p. 921-940.

526. Granger, H. C., and Raup, R. B., 1962, Reconnaissance study of uranium deposits in Arizona: U.S. Geological Survey Bulletin 1147-A, p. A1-A54.

739. Krieger, M. H., 1974 [1975], Geologic map of the Crozier Peak Quadrangle, Pinal County, Arizona: U.S. Geological Survey Geologic Quadrangle Map GQ-1107, scale 1:24,000.

741. Krieger, M. H., 1977, Large landslides, composed of megabreccia, interbedded in Miocene basin deposits, southeastern Arizona: U.S. Geological Survey Professional Paper 1008, 25 p.

1050. Ransome, F. L., 1923, Description of the Ray Quadrangle: U.S. Geological Survey Folio 217, 24 p., maps.

1125. Schmidt, E. A., 1971, A structural investigation of the northern Tortilla Mountains, Pinal County, Arizona: University of Arizona, PhD thesis, 248 p.

1286. U.S. Bureau of Mines Files: U.S. Bureau of Mines, Denver, Colorado, 80225.

1298. U.S. Geological Survey, 1969, Mineral and water resources of Arizona: 90th Congress, 2nd Session, Comittee Print, Washington, U.S.

Government Printing Office, 638 p. Prepared by the U.S. Geological Survey, Arizona Bureau of Mines and the U.S Bureau of Reclamation.

1420. Yeend, W., Keith, W. J., and Blacet, P. M., 1977, Reconnaissance geologic map of the Ninetysix Hills NW, NE, SE, and SW Quadrangles, Pinal County, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-909, scale 1:62,500.

Riverside (Kelvin, MD; sa Wooley)

46. Anthony, J. W., Williams, S. A., and Bideaux, R. A., 1977, Mineralogy of Arizona: Tucson, Arizona, University of Arizona Press, 255 p.

47. Arizona Bureau of Geology and Mineral Technology File data: Tucson, Arizona, Arizona Bureau of Geology and Mineral Technology, 85719.

96. Banks, N. G., 1982, Sulfur and copper in magma and rocks, Ray deposit, Pinal County, Arizona, in Titley, S. R., ed., Advances in geology of the porphyry copper deposits, southwestern North America: Tucson, Arizona, University of Arizona Press, p. 227-257.

182. Bradfish, L. J., 1979, Petrogenesis of the Tea Cup granodiorite, Pinal County, Arizona: University of Arizona, MS thesis, 160 p.

298. Cornwall, H. R., 1982, Petrology and chemistry of igneous rocks, Ray porphyry copper district, Pinal County, Arizona, in Titley, S. R., ed., Advances in geology of the porphyry copper deposits, southwestern North America: Tucson, Arizona, University of Arizona Press, p. 259-273.

300. Cornwall, H. R., Banks, N. G., and Phillips, C. H., 1971 (1972), Geologic map of the Sonora Quadrangle, Pinal and Gila Counties, Arizona: U.S. Geological Survey Geologic Quadrangle Map GQ-1021, scale 1:24,000.

301. Cornwall, H. R., and Krieger, M. H., 1975, Geologic map of the Kearny Quadrangle, Pinal County, Arizona: U.S. Geological Survey Geologic Quadrangle Map GQ-1188, scale 1:24,000.

302. Cornwall, H. R., and Krieger, M. H., 1975, Geologic map of the Grayback Quadrangle, Pinal County, Arizona: U.S. Geological Survey Geologic Quadrangle Map GQ-1206, scale 1:24,000.

318. Creasey, S. C., Gambell, N. A., and Peterson, D. W., 1975, Preliminary geologic map of the Teapot Mountain Quadrangle, Pinal County, Arizona: U.S. Geological Survey Open-File Report 75-314, scale 1:24,000.

341. Damon, P. E., 1970, Correlation and chronolgy of ore deposits and volcanic rocks: U.S. Atomic Energy Commission Annual Progress Report COO-689-130, 192 p.

351. Darton, N. H., 1925, A resume of Arizona Geology: Arizona Bureau of Mines Bulletin 119, 298 p.

430. Eberly, L. D., and Stanley, T. B., Jr., 1978, Cenezoic stratigraphy and geologic history of southwestern Arizona: Geological Society of America Bulletin, v. 89, no. 6, p. 921-940.

436. Elsing, M. J., and Heineman, R. E. S., 1936, Arizona Metal Production: Arizona Bureau of Mines Bulletin 140, Economic Series 19, 112 p.

455. Evensen, J., 1961, Geology of the Copper Hill area, Winkelman, Arizona: University of Arizona, MS thesis, 45 p.

PROSPECT Kelvin

COUNTY Pinal STATE AZ

SAMPLE LOG

SAMPLE NUMBER	LOCATION		DESCRIPTION	RADIOACTIVE ELEMENTS			PATHFINDER ELEMENTS							BASE METALS				SULFO-SALTS		PRECIOUS METALS	
	LEGAL	GEOGRAPHIC	LITHOLOGY AND MINERALIZATION	U_3O_8	eU	eTh			W	Acid Sol Ba	Total Ba %	F	Hg	Cu	Mo	Pb	Zn	As	Sb	Au	Ag
4870	SE/SE Sec 11 T4S, R13E	Mouth of gulch drng. South near drillsite	Cse gr granite por. granite phyllic & pyritic alteration																	.005	<.2
4870-A	"	near gulch FX	Prop. altered granite																	.002	<.2
4870-B	"	Midway up gulch	Pyritic, argillic altd granite - near edge py alt																	.004	<.2
4870-C	"	"	Qtz-magnetite vein zone nr 4870-B																	.004	<.2
4871	SE/SE Sec 8 T4S, R13E	Rare Metals Mine vicinity.	Potassic altered granite																	.007	0.4
4871-A	SW/SW Sec 9 T4S, R13E	Shaft 1000' N of Rare Metals	Potassic altd granite with abnt chlorite																	.001	1.4
4871-B	NW/SW Sec 17 T4S, R13E	Wash	50 ft shear zone; K alt gr. with wk silic. py & CuOx																	.024	6.1
4884	NW/NW Sec 31 T4S, R13E	Dump - West Shaft Peg Leg Mine	Select sample of 2-3 ft WNW vein; Bx Qtz & lim after cpy, gal																	.015	5.6
4884-A	"	"	General Dump sample granite por & aplite																	<.001	0.3
4884-B	"	cut adj. to E shaft	Sheared diabase? chlorite & siderite																	.003	3.5
4884-C	"	Dump - North shaft	Silicified micro Bx aplite & diabase																	.004	6.7
4884-D	NE/~~NE~~ SE Sec 16 T4S, R13E	West end WNW trending ridge	Wk pyritic alt. granite w/ qtz vlts & minor cpy																	.047	4.0

1 VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %.

PROSPECT Kelvin - Ripsey

COUNTY Pinal STATE AZ

SAMPLE LOG

SAMPLE NUMBER	LOCATION		DESCRIPTION	RADIOACTIVE ELEMENTS			PATHFINDER ELEMENTS							BASE METALS				SULFO-SALTS		PRECIOUS METALS	
	LEGAL	GEOGRAPHIC	LITHOLOGY AND MINERALIZATION	U_3O_8	eU	eTh			W	Acid Sol Ba	Total Ba %	F	Hg	Cu	Mo	Pb	Zn	As	Sb	Au	Ag
4885	NE/NW Sec 33 T4S, R13E	West Cut Wooley Bx type	Potassic alt. - pyr, clay & qtz vugs in fragmental Bx																	.005	3.6
4885-A	"	"	Select of interstial qtz, limonite & oxide Cu in Bx																	.007	38.7
4885-B	SE/NE Sec 32 T4S, R13E	Vol. pit near gate on road to Wooley	Sheared diabase - chlorite & siderite alteration																	.076	120
4909	SW/NE Sec 32 T4S, R13E	old pit SE of road Fork	Potassic altd. granite - NW Trending shear w/dissem. py-cpy																	.016	47.7
4909-A	"	"	2½ ft "late" E-W shear in Bx granite w/qtz vein & pyrite																	.045	148
4909-B	"	Vol pit S of gate to Wooley	3 ft sample of sheared pyrite vein adj. to diabase																	.282	105
4909-C	NE/SE Sec 20 T4S, R13E	Shaft Dump	chlorite altd sheared diabase specularite & hematite stain																	.004	<.2
4909-D	NW/SE Sec 20 T4S, R13E	Ridge N&E of road	50 to 100 ft wide shear zone weak pyrite & silicification																	.001	1.3
4910	NE/NW Sec 15 T4S, R13E	Twin Adits w bank Ripsey Wash	Csely fragmental granite Bx chlorite w/minor siderite & Cu Ox.																	.018	0.8
4910-A	NE/SW Sec 15 T4S, R13E	Short Adit East Bank Ripsey Wash - S of Power lines	5 ft sample of shear & Bx w qtz-pyrite-siderite-chlorite in adit																	.185	1.6
4910-B	SW/SW Sec 23 T4S, R13E	Wash w/ jeep road E side Ripsey	Granite Bx in road cut above & north of wash - siderite-clay & wk pyrite alteration																		
4910C	"	" north bank wash	Fine-gr granite - chlorite & weak hematite limonite																	<.001	<.2
4910-D	"	"	100 ft sample of sheared Bx fgr granite - wk pyrite alteration																	.004	<.2

1 VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %

SAMPLE LOG

PROSPECT Kelvin - Ripsey

COUNTY Pinal STATE AZ

SAMPLE NUMBER	LOCATION		DESCRIPTION	RADIOACTIVE ELEMENTS			PATHFINDER ELEMENTS							BASE METALS				SULFO-SALTS		PRECIOUS METALS	
	LEGAL	GEOGRAPHIC	LITHOLOGY AND MINERALIZATION	U_3O_8	eU	eTh			W	AcidSol Ba	Total Ba %	F	Hg	Cu	Mo	Pb	Zn	As	Sb	Au	Ag
4910-E	SW/SW Sec 23 T4S, R13E	Wash w/ jeep road E side Ripsey Wash	Shattered & Bx diabase at contact w/ granite - chlorite & wk hem. lim.																	<.001	<.2
4910-F	"	"	Chlorite altd, light green diabase west of Bx granite																	.006	<.2
4910-G	"	"	Select sample of coarse xl carbonate vlts in diabase calcite & black calcite																	.015	<.2
4910-H	"	"	Shattered diabase - epidote minor carbonate - west contact with vertical tuff?																	.001	<.2
		Ripsey Area																			
4911	NW/SE Sec 10 T5S, R13E	East-West Ridge E of BM 3339	weak pyritic altd porphyry																	.015	0.2
4911-A	"	Pit adjacent to North of road	Potassic altd breccia assem py & cpy																	.003	1.2
4911-B	NE/SE Sec 11 T5S, R13E	Bank of Wash E of Ripsey WM	wk pyritic altd Fault Bx																	.005	<.2
4911-C	SE/NE Sec 11 T5S, R13E	Bluff E side wash S of Power lines	Pyritic-argillic altd porphyry																	.004	0.2
4911-D	"	"	Shattered pyritic altd Dripping Spg Qtzite																	.001	0.5
4911-E	SE/SE Sec 11 T5S, R13E	Cut above Ripsey Mill foundation	Shear zone at head of cut w/ qtz & pyrite																	.002	<.2
4911-F	"	"	Sheared diabase - chlorite & weak limonite																	.009	<.2
4911-G	"	E bank wash S of old Mill	Pyritic altered brecciated granite																	<.001	<.2

1 VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %.

PROSPECT Kelvin - Ripsey

COUNTY Pinal STATE Arizona

SAMPLE LOG

SAMPLE NUMBER	LOCATION: LEGAL	LOCATION: GEOGRAPHIC	DESCRIPTION: LITHOLOGY AND MINERALIZATION	RADIOACTIVE ELEMENTS: U_3O_8	eU	eTh	PATHFINDER ELEMENTS		W	AcidSol Ba	Total Ba %	F	Hg	BASE METALS: Cu	Mo	Pb	Zn	SULFO-SALTS: As	Sb	PRECIOUS METALS: Au	Ag
4918	NE/SW Sec 15 T4S, R13E	Adit - E. Bank Ripsey Wash on S side Pwr Line	2.5 ft - vein Hang wall - Bx granite carbonate, minor qtz, lim. & MnOx																	.262	0.4
4918-A	"	"	1.5 ft NW trending vein Qtz, black hematite & MnOx																	3.03	2.1
4918-B	"	"	2.5 ft on S side of vein sheared granite siderite MnOx minor hematite limonite																	5.60	1.8
4918-C	"	"	3 ft - from 2.5 to 5.5 ft on S side vein, sheared granite minor siderite																	.063	0.2
4918-D	"	"	50 ft sample of wkly alt. sheared granite South of vein																	<.001	<.2
4918-E	"	300 ft south	5 ft clay-srd. alt. low < shear ~ 300 ft South of adit																	.001	<.2
4919	NW/NW Sec 15 T4S, R13E	Sharp ridge W bank Zellweger Wash	wk pyritic granite cut by E-W qtz vlts adj to pyritic zone																	.011	0.7
4919-A	SE/SE Sec 9 T4S, R13E	First shaft N of ridge 300 ft from Sec. cor. Dump	Select of 3 ft silic. Bx with vuggy qtz - E-W.																	.052	2.5
4919-B	"	"	Silicified dike - hematite limonite																	.014	0.7
4919-C	NE/NE Sec 15 T4S, R13E	First wash East of Ripsey	3 ft pyritized granite in center of NW shear on S side granite por. dike																	.384	12.2
4919-D	SE/NE Sec 15 T4S, R13E	2nd wash East of Ripsey	25 ft sample - NW trend - red pyritic granite																	.054	1.3
4919-E	"	Old "prospect cut"	3 ft sample - NW trend shear qtz - hem lim. & MnOx																	14.4	86.1
4919-F	"	" Vgl pit under Pwr line	Prop alt granite ext. to vein N-S slips w/minor Py & Mn																	.176	21.0

VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %

PROSPECT Kelvin - Ripsey

COUNTY Pinal STATE AZ

SAMPLE LOG

SAMPLE NUMBER	LOCATION: LEGAL	LOCATION: GEOGRAPHIC	DESCRIPTION: LITHOLOGY AND MINERALIZATION	RADIOACTIVE ELEMENTS: U_3O_8	eU	eTh	PATHFINDER ELEMENTS		W	AcidSol Ba	Total Ba %	F	Hg	BASE METALS: Cu	Mo	Pb	Zn	SULFO-SALTS: As	Sb	PRECIOUS METALS: Au	Ag
4949	NE/SW Sec 15 T4S, R13E	Adit S of Rvr Lup Ripsey Wash East Bank	10 ft sample Bx granite betw. 2.5 & 12.5' on vein Hg wall. bleached, MnOx - minor limonite																	.020	0.7
																				~~.006~~	~~<.2~~
4949-A	"	" - 4 ft North	6 inch shear - clay & MnOx w/ .50 inch qtz																	.006	<.2
4949-B	"	" 65 ft N of Adit	4 - 6 inch qtz vein MnOx																	.303	<.2
4949-C	"	" 75 ft N of Adit	1.5 ft shear w/ 2 inch qtz - carbonate vein																	.009	0.4
4949-D	"	" 300 ft N of Adit	35 ft sample of brecciated granite																	.005	0.3
4949-E	"	" 400 ft N of Adit	2 ft shear with 2-3 qtz & MnOx veins																	.008	0.2
4949-F	"	" 500 ft "	1 ft vuggy qtz-py vein with MnOx																	.490	17.0
4949-G	SE/NW Sec 15 T4S, R13E	West Bank Rip. Breccia Point	30 ft sample of Bx granite E-W shearing & MnOx																	.153	2.3
4950	SE/NE Sec 15 T4S, R13E	old shaft & cut 2nd Gulch E of Ripsey Wash	5 ft (vert) across low ∠ shear in cut 1-2 ft hem-lim Bx granite																	.011	3.2
4950-A	"	"	select of 3 inch to 1 ft qtz-py vein above low ∠ shear																	.329	2.3
4950-B	"	" Southern vein	Select of 6 inch qtz-py vein material on H. Wall																	.111	3.3
4950-C	"	"	~~sel.~~ 3-4 in qtz vein and 1 ft silic granite on Ft wall																	.041	2.3
4950-D	"	"	2.5 ft sheared py altd granite between qtz vein [illegible]																	.027	1.4

PROSPECT Kelvin - Ripsey

COUNTY Pinal **STATE** AZ

SAMPLE LOG

SAMPLE NUMBER	LOCATION: LEGAL	LOCATION: GEOGRAPHIC	DESCRIPTION: LITHOLOGY AND MINERALIZATION	RADIOACTIVE ELEMENTS: U_3O_8	eU	eTh	PATHFINDER ELEMENTS		W	AcidSol Ba	Total Ba %	F	Hg	BASE METALS: Cu	Mo	Pb	Zn	SULFO-SALTS: As	Sb	PRECIOUS METALS: Au	Ag
4950-E	SE/NE Sec 15 T4S, R13E	old shaft - 2nd gulch E of Ripsey	Select sample of dark hematite (high py) gossan from N. dump probably the 3 ft hm py zone on hanging of N vein.																	<.001	3.8
4950-F	"	"	Dump - shaft on N. vein 10-15 foot wide pyritic granite																	.012	1.4
4950-G	"	Val cut on E side ridge W at shaft	Deep red colored pyritic altd porphyry - no qtz																	.018	3.3
4951	"	Ridge above cut & shaft	20-30 ft zone of sheared Mn stained granite between veins some thin qtz & rock flour V/TS																	.003	<.2
4951-A	"	South vein E at cut	1 ft pyritic silic Bx with 2 inch jaspery silic gouge on footwall																	.009	2.4
4951-B	"	Hill above shaft	1.5 ft low < silic & pyritized Bx ~ 10 ft S at pyritic zone at shaft																	.040	1.4
4951-C	"	"	2 ft pyritic altd Bx above shaft.																	.003	1.3
4951-D	"	W bank wash West at shaft	5 ft - E-W sheared pyritic altd granite																	.002	2.1
4952	"	Adit E of Forks of wash	Dump - select of recement. druzy qtz Bx																	.067	1.0
4952-A	"	Cut near top of ridge above adit	1 ft Bx, qtz & hem lim after py N40W, 35 NE																	.054	0.9
4952-B	"	"	4 ft wk py, csp granite on ftwall of vein																	.006	0.2
4952C	"	"	3 ft "sanded" clay - chlorite altd porphyry on HW																	.026	<.2

1 VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %

PROSPECT Kelvin - Ripsey

COUNTY Pinal STATE AZ

SAMPLE LOG

SAMPLE NUMBER	LOCATION: LEGAL	LOCATION: GEOGRAPHIC	DESCRIPTION: LITHOLOGY AND MINERALIZATION	RADIOACTIVE ELEMENTS: U_3O_8	eU	eTh	PATHFINDER ELEMENTS		W[1]	AcidSol Ba[1]	Total Ba %	F[1]	Hg[1]	BASE METALS: Cu[1]	Mo[1]	Pb[1]	Zn[1]	SULFO-SALTS: As[1]	Sb[1]	PRECIOUS METALS: Au[1]	Ag[1]
4952-D	SE/NE Sec 15 T4S, R13E	Adit & cut at Wash Fork; Cut North of adit dump	Select of 6 inch qtz-py vein.																	1.97	14.8
4952-F	"	"	Ft wall of vein - 5 ft of Mn st. sheared granite w/ few qtz stringers																	.172	3.0
4953	"	E Fk Wash at Power line crossing Bx granite - Fault to East	50 ft sample Bx. granite wk pyritic alt. - lower part of cliff on NE side wash																	.017	0.2
4953-A	"	"	40 ft sample " above 53																	.008	<.2
4953-B	"	" West side upper part cliff	4 ft vert sample of subhor. py-clay alt'd zone in Bx granite																	.006	0.4
4953-C	" on sec line	Top of ridge ~500 ft Northwest	Float - qtz-spec.-py veins in Mn st. alt. granite																	.042	0.6
4954	"	S Fk of 2nd gulch E of Ripsey	W bank - green shaft granite with chalcedony.																	.010	0.2
4954-A	" ~500 ft S of adit	" E bank wash	25 ft sample of Bx granite Mn stain, minor qtz & py.																	.026	0.4
4954-B	"	Prospect pit beneath Power line	3 ft of sheared silic granite some qtz & lim altd pyrite																	8.4	78.9
4955	SW/NE Sec 14 T4S, R13E	Cut & adit S of Power line on E side Wash.	.5 to 1 ft hem limonite shear zone																	.002	5.5
4955-A	"	"	3 ft clay-chlorite altd granite w/ cuox on S side of shear.																	.004	5.2
4955-B	NE/SE Sec 11 T4S, R13E	West side Wash @ BM 1940	Dump sample - select high pyrite vein material																	.015	3.2

1 VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %

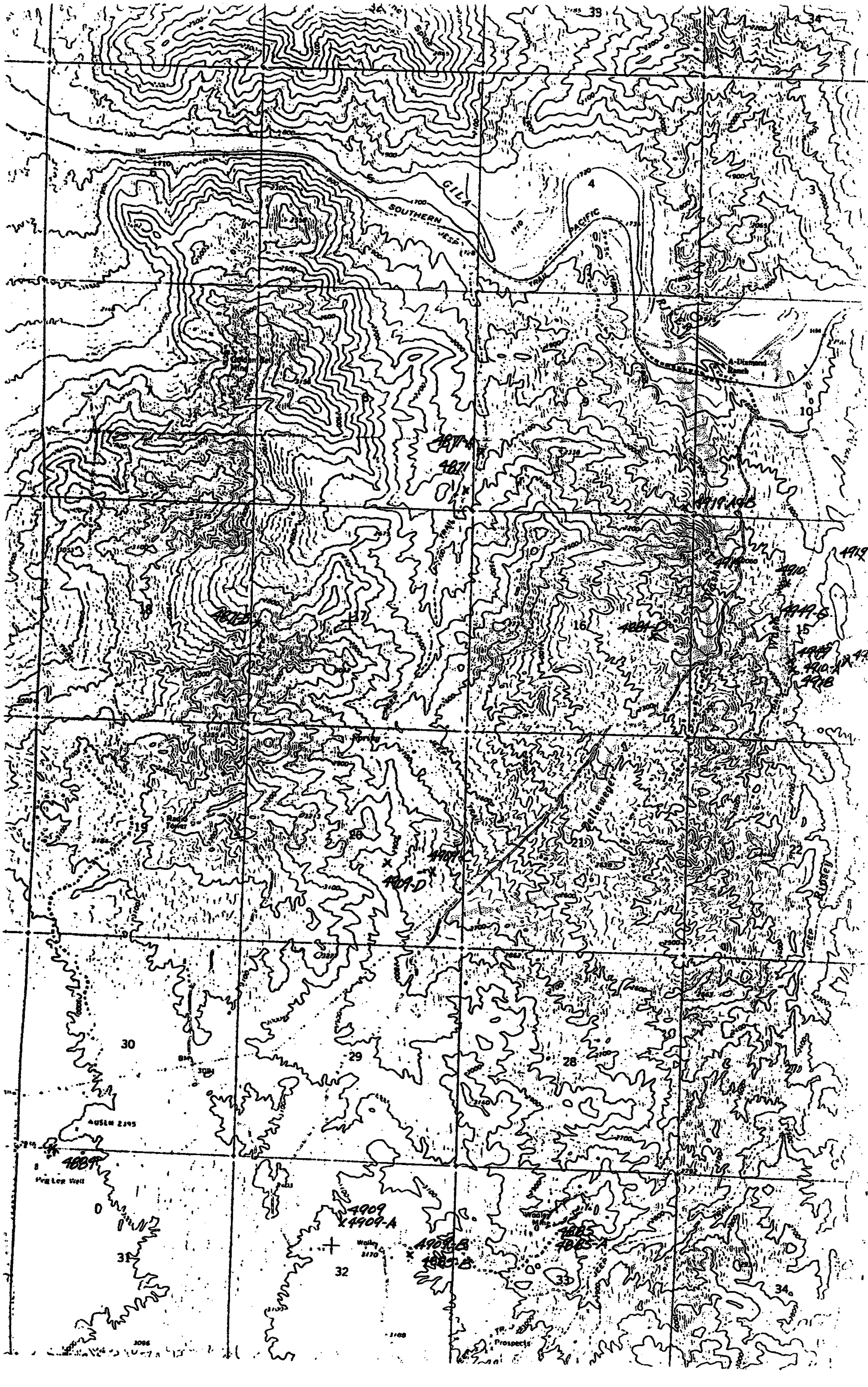
PROSPECT Kelvin - Ripsey

COUNTY Pinal STATE AZ

SAMPLE LOG

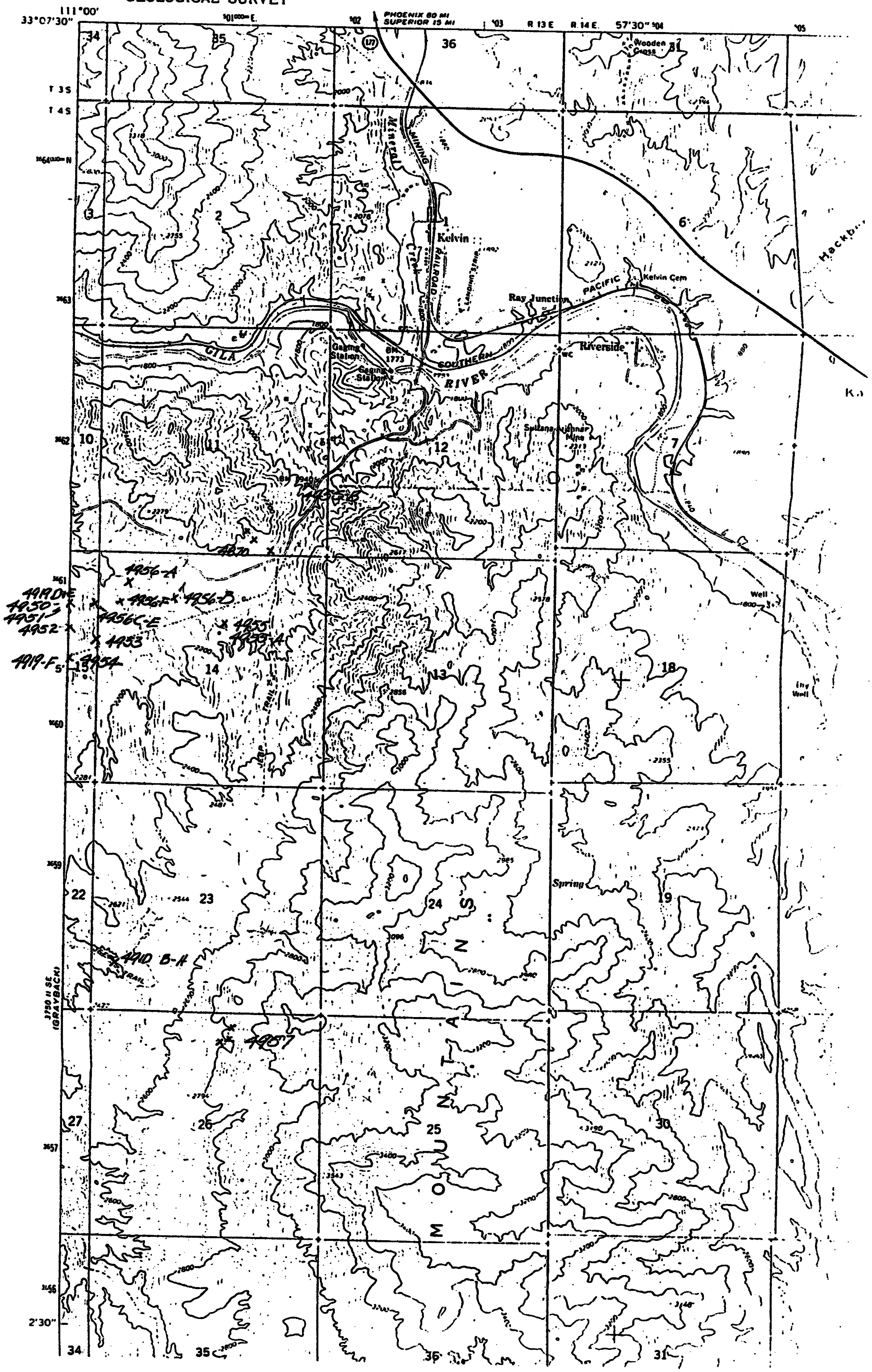
SAMPLE NUMBER	LOCATION		DESCRIPTION	RADIOACTIVE ELEMENTS			PATHFINDER ELEMENTS							BASE METALS				SULFO-SALTS		PRECIOUS METALS	
	LEGAL	GEOGRAPHIC	LITHOLOGY AND MINERALIZATION	U_3O_8	eU	eTh			W	Acid Sol Ba	Total Ba %	F	Hg	Cu	Mo	Pb	Zn	As	Sb	Au	Ag
4956	NE/SE Sec 15 T4S, R13E	500 ft S of Power Line - 1st gulch E of Ripsey	4 ft Bx granite - limonite & MnOx																	.013	0.2
4956-A	NW/NW Sec 14 T4S, R13E	S bank of East drng	2 ft Bx granite w/ MnOx below Cngl.																	.065	1.0
4956-B	NE/NW Sec 14 T4S, R13E	5 Fk of East wash	Bx granite - limonite & MnOx																	.006	0.3
4956-C	NE/NE Sec 15 T4S, R13E	Prospect on Top of ridge	1.5 ft NW Trend qtz-py vein - dip 25-30°W																	6.91	4.1
4956-D	"	"	4 ft on FT wall of vein Clay alt granite w/ thin limonite seams																	.076	0.9
4956-E	"	N slope Hill N of Prospect	Bx granite, minor qtz vlts MnOx																	.094	1.2
4956-F	NW/NW Sec 14 T4S R13E	Wash E of Prospect	Bx bleached sericite granite w/ lim on fractures																	.003	0.7
4957	NW/NE Sec 26 T4S R13E	Old Prospect bottom of wash	West edge phyllic alt. Bx alt silica vlts & bxm limonite after dissem pyrite																	.002	<.2
4957-A	"	N & above wash	Alt granite @ S end phyllic alt'd Bx; cse sericite pyrite & some qtz																	<.001	<.2
4957-B	"	Mouth of adit bottom N wash.	Phyllic altd cse gr. granite dissem pyrite & spec.																	.002	<.2
4958	SE/NW Sec 1 T5S, R13E	Val pit - S slope Hill on E side old road	Pyrite altered porphyry adj to limestone																	.381	2.5
4958-A	"	Val pit? on Top of Hill	wk pyrite altd diabase minor thin pyrite vlts																	.009	6.6

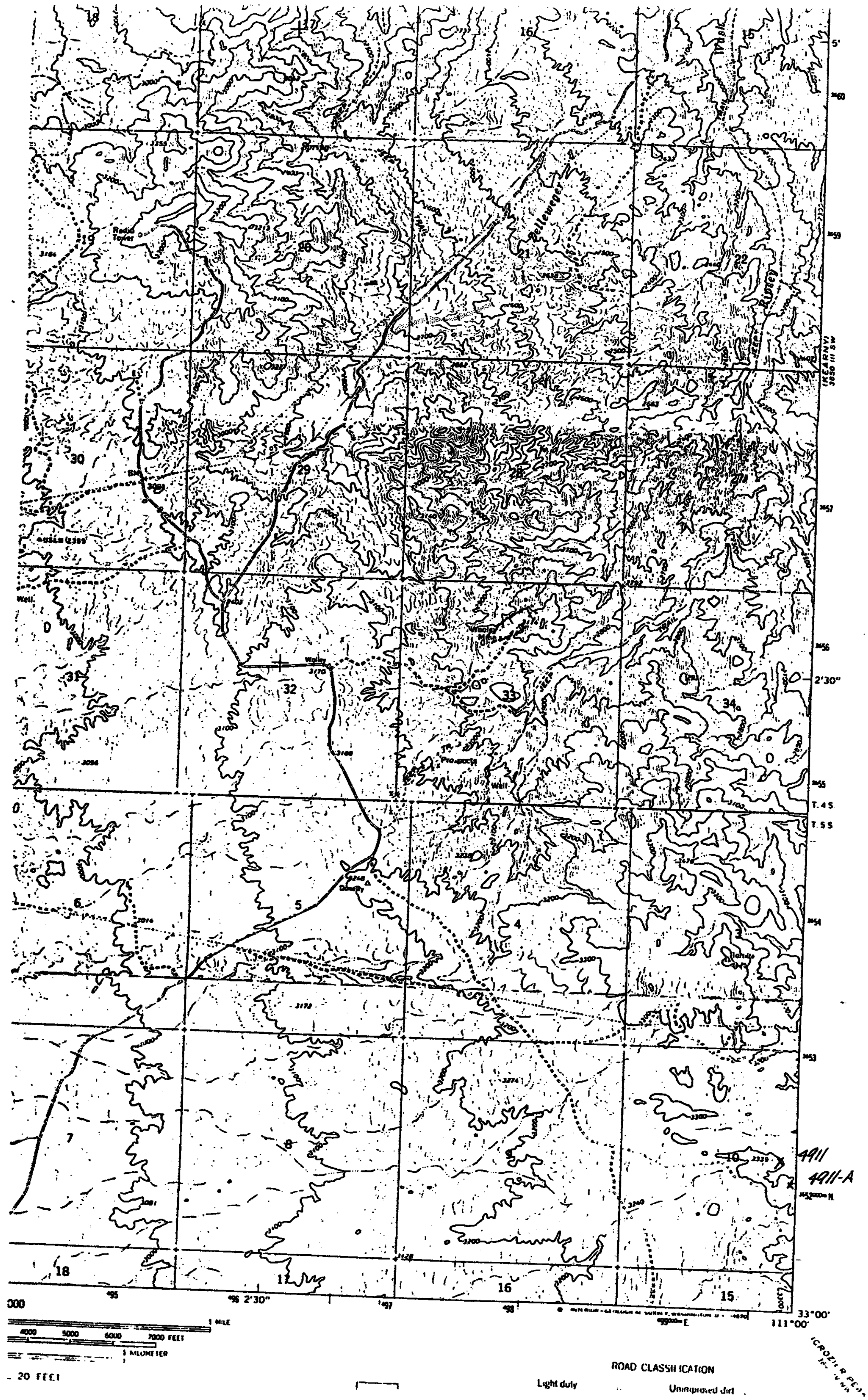
¹ VALUES IN PPM EXCEPT "TOTAL BARIUM" WHICH IS IN %



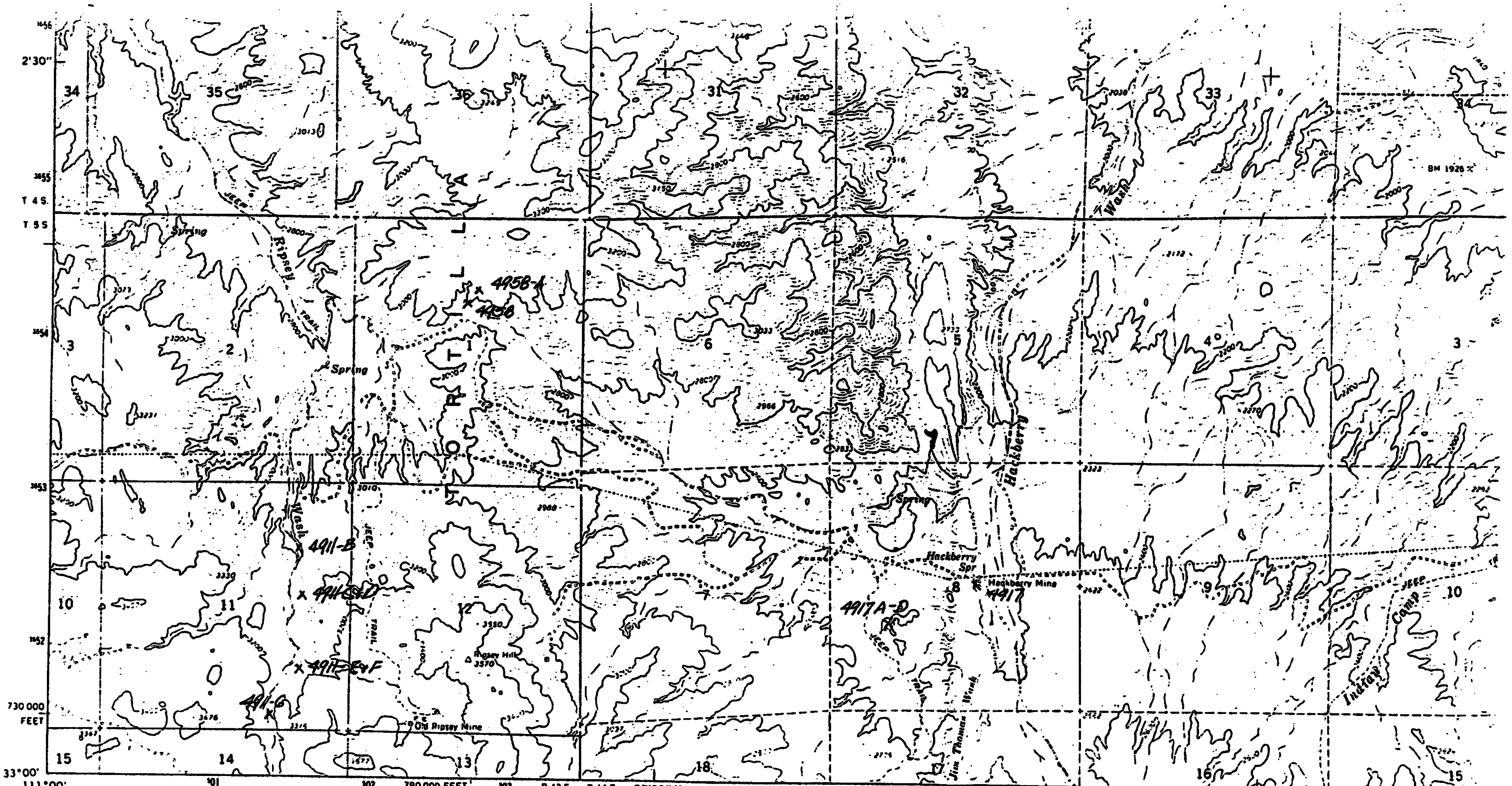
GILA
SOUTHERN
PACIFIC
A-Diamond Ranch
Golden Bell Mine
Radio Tower
Peg Leg Well
Prospects
Spring
4871
4919
4910
4909
4909-A
30
29
28
32
33

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY





Radio Tower
Well
T.4S
T.5S
2'30"
33°00'
111°00'
4911
4911-A
1 MILE
7000 FEET
1 KILOMETER
ROAD CLASSIFICATION
Light duty
Unimproved dirt



3769 I NE
(NINETYSIX HILLS NE)

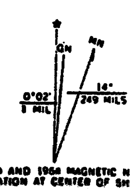
Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1964

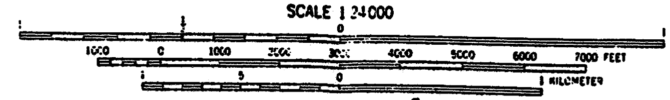
Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines



UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000



CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

S33' L-16

Date: September 25, 1983

Professional Report Describing the Kelvin Property-Johnson Holdings
Mineral Creek Mining District, Pinal County Arizona

by Richard J. Lundin , Mineral Exploration Consultant

WALLABY ENTERPRISES

Mining District Data Base Program

1. Mine or Property Name:
Kelvin Property-Johnson Holdings

2. Mining District, County & State:
Mineral Creek Dist., Pinal County AZ

3a. Quadrangles or Map Names:
Grayback 7½' USGS Topographic Map

3b. Location: T 4S R 13E S 8,9,17
(see Figure 1)

3c. Lat. ________ Long. ________

4. Any Former Names:
Zelleweger Mine, Black Copper Claims

5. Owner: John M. Johnson, Century Copper & Molybdenum Co. & the Estate of A.H. Johnson

6. Address (Owner):
1201 Overstreet, Prescott
Arizona 86301

7. Operator: Leased to Wombat Mining Co.

8. Address (Operator):
~~3425 W. Bardot St.~~
~~Tucson AZ 85741~~
~~(602) 744-2700~~
1555 Iron Springs Rd, Ste 39
Prescott AZ 86301
(602) 445-9354

9. Principal Metals: Cu, Mo, Au, Ag

10. Mining & Milling Operations: Kinds & Capacities

Present:

Past: Small pilot plant on property during the 1950's to concentrate Molybdenum ores. Approximately 1000 tons of past production of Au-Cu-Ag-Mo ores from the Zelleweger Mine.

11. Number of Claims, Title, etc. (Please include a sketch map or plat showing location, T. R. & Sec., and the general outline of each group)
57 unpatented federal lode claims, registered with the BLM. (see figure 1 for the location of the holdings)

12. Previous Published or Unpublished Reports: E. Schmidt (1971a, 1971b), ADMR File Data, Numerous unpublished company reports by Cities Service, Cyprus, Hanna-Getty, Minbanco, Tipperary Resources, Kerr-McGee, Inspiration and Wombat Mining Co.

13. Names of Mining Companies or Governmental Agencies that have worked, or are now working on this property. (see list above) and the Arizona Department of Mineral Resources, U.S.B.M. and U.S.G.S.

14. Ore & Gangue Minerals: chalcopyrite, molybdenite, chalcopyrite, cuprite, tenorite, azurite, chrysocola, malachite, sphalerite, pyrite, galena, native gold and minor argentite, uraninite and scheelite.

15. Geology:
(please include any Geologic Maps, Sketches or Cross Sections)
Precambrian Oracle Granite intruded by later Precambrian diabase sills and dikes. The entire Precambrian section is intruded by dike swarms of Laramide age that trend east-northeasterly and range in composition from quartz monzonite to quartz latite and rhyolite. The dikes may be related to the 62.9 mybp. Grayback granodiorite stock. (see figures 2-5 for further information)

16. Type of Mineralization-Metallurgical Considerations:
(please check appropriate box or boxes)
Cu-Mo mineralization associated with alteration assemblages that range from phyllic-potassic. Pyrite chalcopyrite-molybdenite mineralization occurs in veins and stockwork mineralization throughout a strongly ftractured and altered mass of Laramide and Precambrian intrusive rocks. Later gold and molybdenum mineralization is associated with NW striking altered and silicified zones and E-W striking silicified shear zones. Most disseminated and stockwork mineralization is deeply buried (1000-1500') Outcropping Cu-Au mineralizat: is associated with the E-W striking silicified shear zones.

_____ Vein or Lode
_____ Stratiform
_____ Disseminated
_____ Placer
_____ Oxide
_____ Sulfide
_____ Other ________________

17. Ore Reserves: Dumps____________tons @____________grade

Tailings____________tons @____________grade

Indicated ore reserves from CSMC drilling data: 113,000,000 tons of material that would average .60% Cu with Mo and Au credits.

18. Mine, Mill Equipment & Flow Sheet:
none

19. Road Conditions, Route: Good roads to property from Kearney and Florence and good access throughout the property due to past drilling activity.

20. Water & Power Supply: Water available from the adjacent Gila, 1000 KVA powerline cuts through the property, active railroad main line cuts through the property.

21. Extent of Development: (Please include any maps, plans, sketches, longitudinal or cross sections of underground or surface workings)
Partially delineated porphyry Cu-Mo deposit with numerous small pits and shallow workings on high grade Cu, Mo, Au fissure veins and oxide copper gossans. (see figures 2,3 & 6)

22. Brief History: Prospecting in the Kelvin area was probably initiated in the period 1910-1920. The Zelleweger claim was patented in 1924 and it is reported that $40,000 in gold, copper and zinc was shipped from the claim in the period 1920-1930. In 1933 Mr. A. H. Johnson located several "Black Copper claims" and prospected surficial outcrops of gold-copper-molybdenum mineralization. He constructed a mill on the property in the 1950's and shipped several carloads of Cu-Mo-Au concentrates. Johnson and his sons continued prospecting the area until the property was leased to a series of several companies. (1967-1978) Leased to Wombat Mng. Co in 1980.

23. Previous Sampling, Drilling & Other Studies on Dumps or Tailings: 13 core or rotary holes have been drilled to depths of 2500'. Six of which have encountered ore grade material over intervals greater than 50 feet. (see figure 5) Reports, results and core available for inspection.

24. Environmental-Social-Political Conditions & Considerations: The area is one of extensive past mining and exploration activities. It is adjacent to a proposed resevoir withdrawl area and is adjacent to the Gila River and Southern Pacific main line from Kearney, 1000 KVA line transects the property and the property is 3 miles away from the Ray Mines Division of Kennecott Corp. open pit mine & smelter.

25. Sampling: Extensive sampling done by many companies. Reports and results available.

Sample Nos:

Sample Types or Types:

26. Assaying: Numerous assays available from surface work and drilling operations.

27. Financial Terms, Conditions & Considerations: Property currently under lease to Wombat Mining Co. Sublease with option to purchase available.

28. Remarks: Geologic mapping and geochemical sampling of areas with outcropping Cu-Fe mineralization delineated an area with strong alteration and anomalous Au values. Further drilling needs to be done to test these areas as potential bulk tonnage gold targets with accessory copper values.

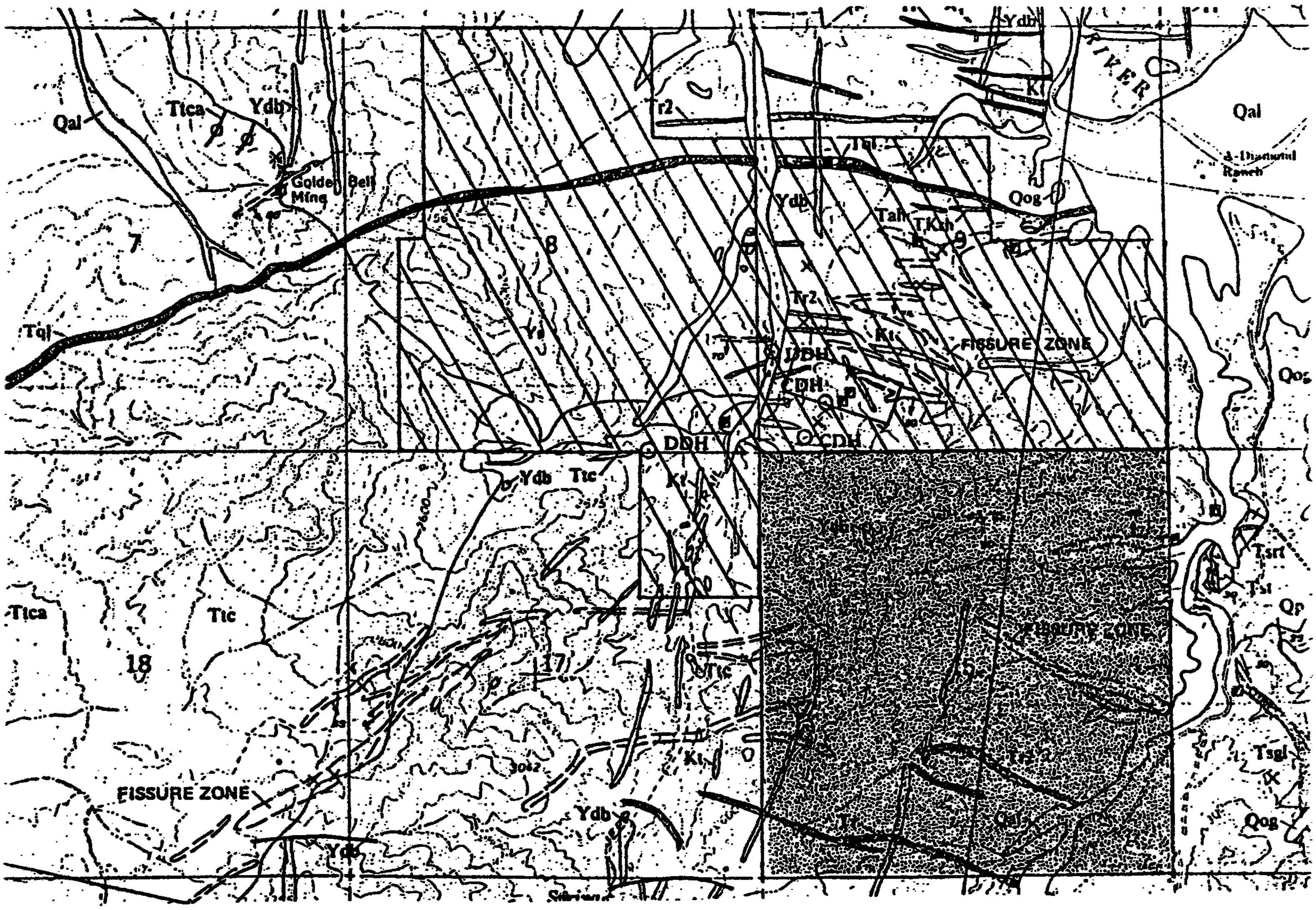
29. Date: September 25, 1983 Signature ____________

Richard J. Lundin, Mineral Exploration Consultant and President of Wallaby Enterprises Inc. has a BA degree in Anthropology and Geology from Beloit College Wisconsin and 10 years experience in the evaluation of base and precious metal deposits in the United States and abroad.

WOMBAT MINING COMPANY

3425 W. Bardot St.

Tucson, Arizona 85741



LEGEND-Figure 1

Claims leased by Wombat from J. Johnson et al

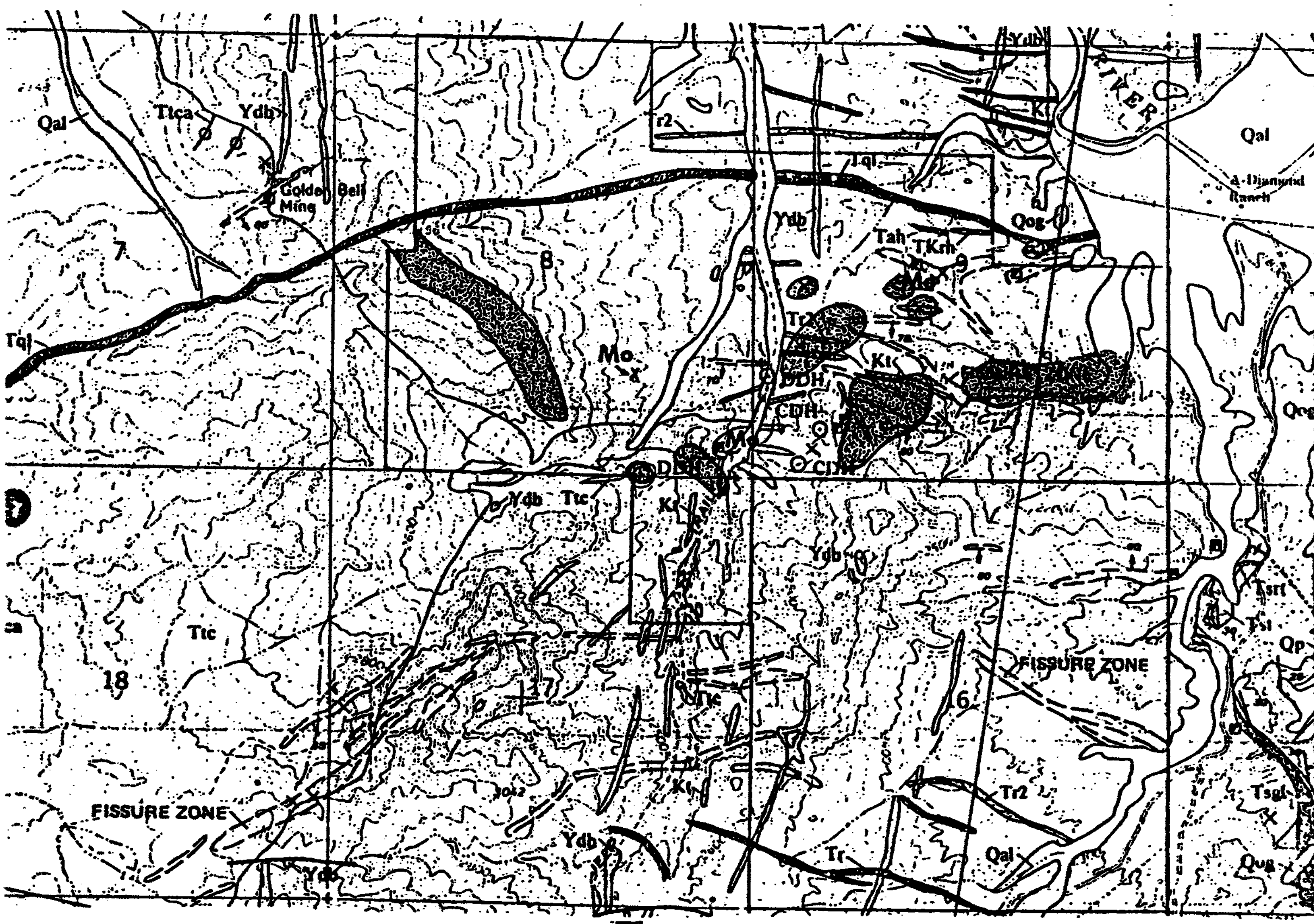
Arizona State Prospecting Permit held by Wombat

Patented Claim owned by Tipperary Resources Corp.

WOMBAT MINING COMPANY

3425 W. Bardot St.

Tucson, Arizona 85741



LEGEND-Figure 2

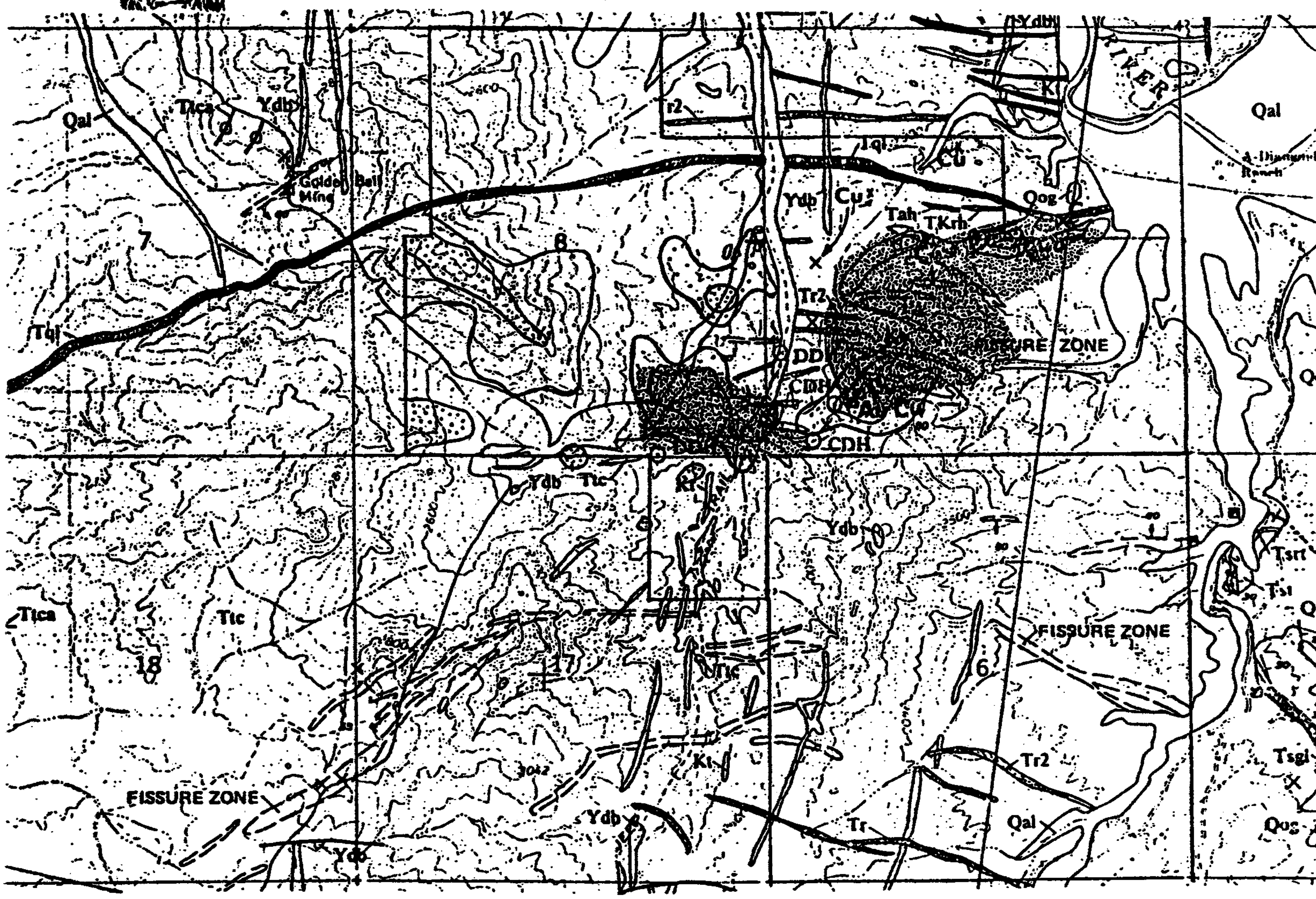
Areas with Rock Chip Samples containing greater than 10 parts per million Mo

X Mo — Molybdenum occurrences

WOMBAT MINING COMPANY

3425 W. Bardot St.

Tucson, Arizona 85741



LEGEND-Figure 3

Areas with Rock Chip Samples containing greater than 300 parts per million Cu

Areas with Rock Chip Samples containing greater than 600 parts per million Cu

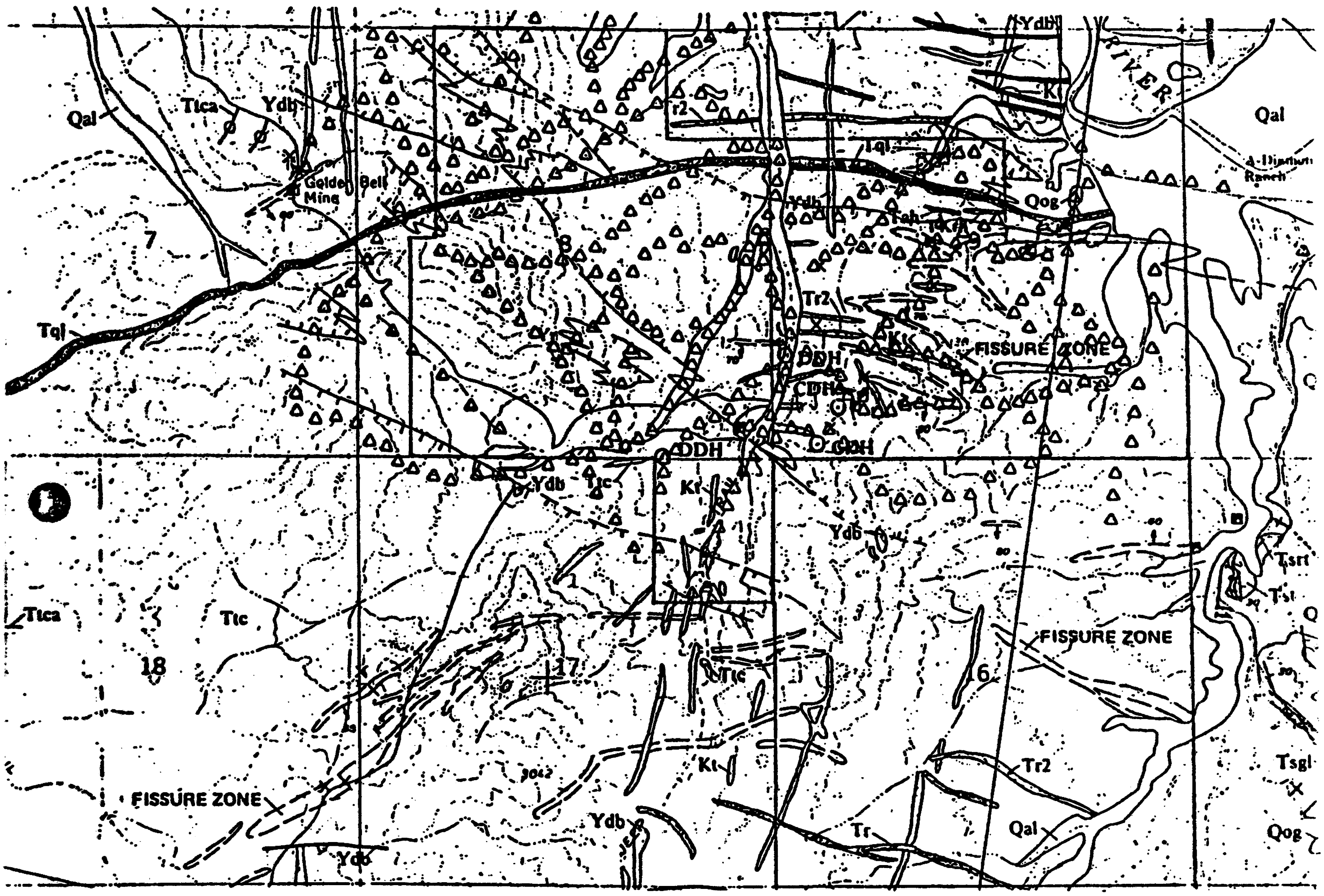
Cu Au Cu & Au occurrences

Areas with anomalous Au values

WOMBAT MINING COMPANY

3425 W. Bardot St.

Tucson, Arizona 85741

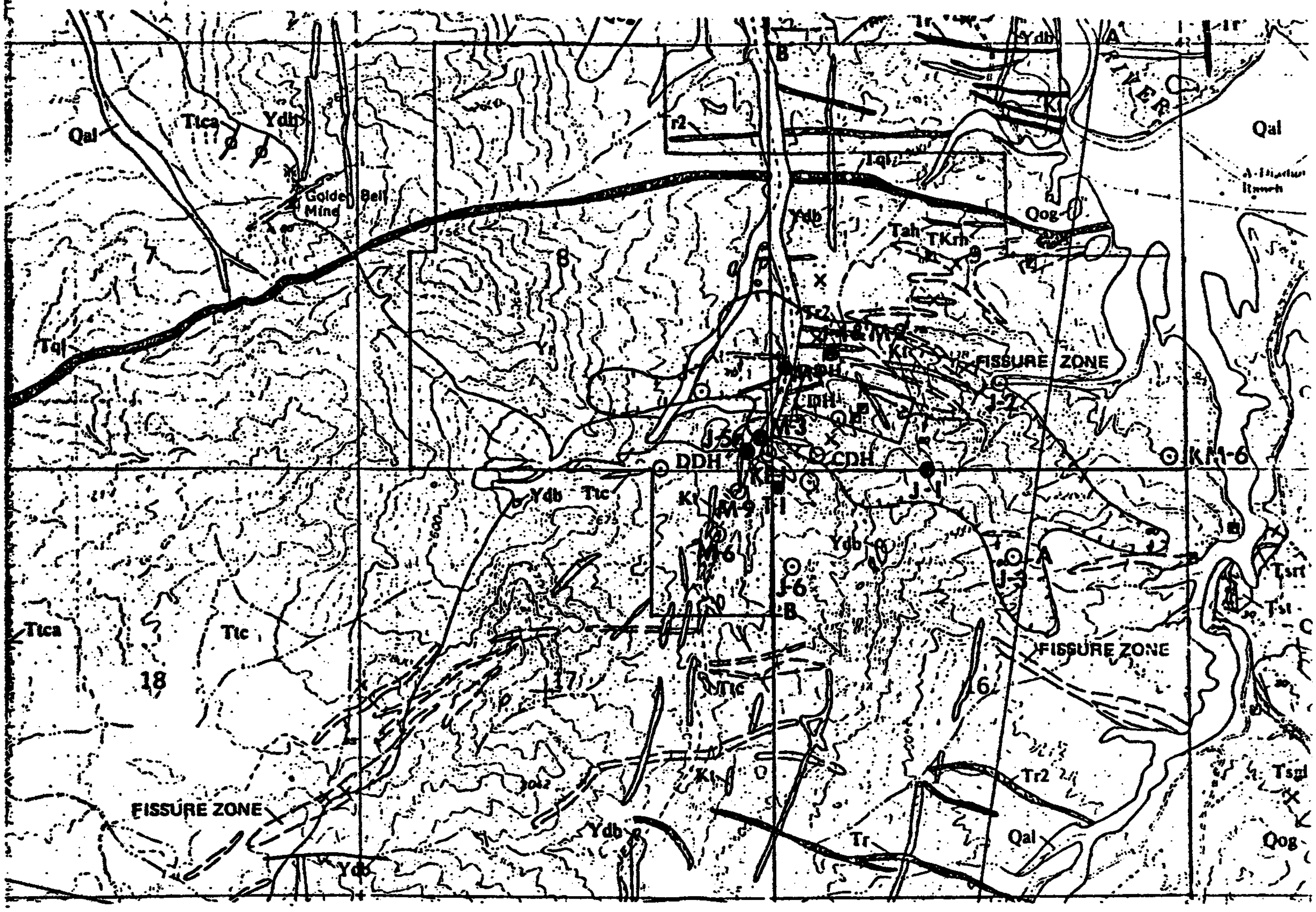


LEGEND-Figure 4

△ Location of Radiometric Survey Stations

Limit of Radiometric Anomalism

WOMBAT MINING COMPANY
3425 W. Bardot St.
Tucson, Arizona 85741



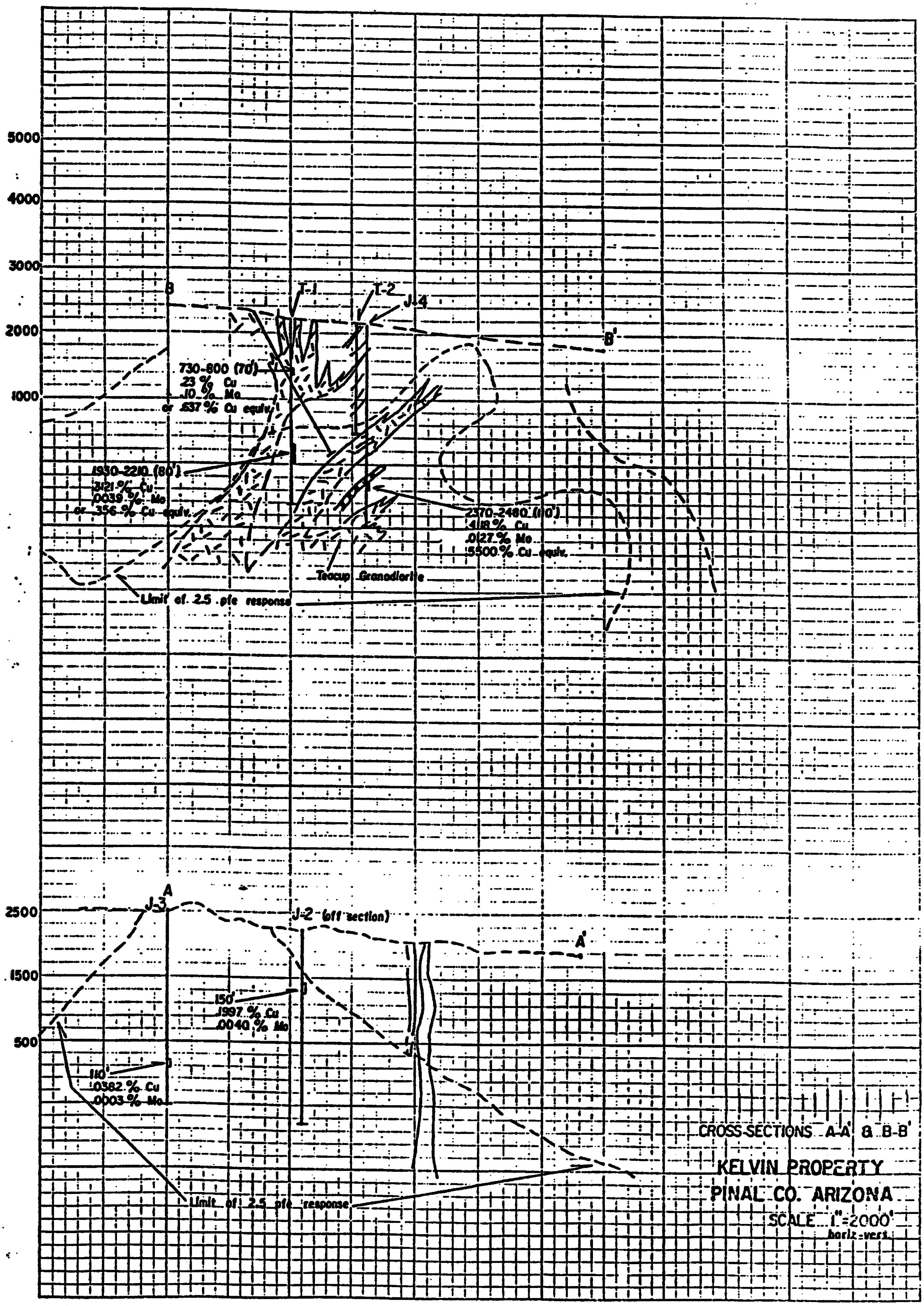
LEGEND-Figure 5

● Drill holes with ore grade intercepts greater than 50 feet

⊙ Drill holes with ore grade intercepts less than 50 feet

Limit of 2.5% PFE anomaly at n=1

A┘ Location of Cross-Sections A-A' & B-B'


5000
4000
3000
2000
1000
B
T-1
T-2
J-4
B'
730-800 (70')
.23 % Cu
.10 % Mo
or .637 % Cu equiv.
1930-2210 (80')
.3121 % Cu
.0039 % Mo
or .356 % Cu equiv.
2370-2460 (110')
.418 % Cu
.0127 % Mo
.5500 % Cu equiv.
Teacup Granodiorite
Limit of 2.5 pfe response
2500
1500
500
A
J-3
J-2 (off section)
A'
150'
.1997 % Cu
.0040 % Mo
110'
.0382 % Cu
.0003 % Mo
J-1
Limit of 2.5 pfe response
CROSS-SECTIONS A-A' & B-B'
KELVIN PROPERTY
PINAL CO. ARIZONA
SCALE 1"=2000'
horiz-vert

ATTACHMENT NO. 1

The following unpatented mining claims situated in Sections 8,9 & 17, Township 4 S., Range 13 E. GSRB & M of Mineral Creek Mining District, Pinal County, Arizona, location notices of which are of record in the Pinal County Court House, are the subject claims to that certain Option Agreement and are attached thereto and made a part thereof and more fully described below:

Name of Claims	Federal Serial Nos.	Recorded	
		Book	Page
Rare Metals No. 1	A MC 63542	51	228
Rare Metals No. 2	A MC 63543	51	229
		Docket	Page
Rare Metals No 3	A MC 63544	77	117
Rare Metals No. 4	A MC 63545	77	118
Rare Metals No. 5	A MC 63546	77	119
Rare Metals No. 6	A MC 63547	77	120
Rare Metals No. 7	A MC 63548	186	127
Rare Metals No. 8	A MC 63549	186	128
Rare Metals No. 9	A MC 63550	186	129
Rare Metals No. 10	A MC 63551	186	130
Rare Metals No. 11	A MC 63552	186	131
Rare Metals No. 12	A MC 63553	186	132
Gray Copper No. 1	A MC 63535	17	431
Gray Copper No. 2	A MC 63536	129	581
Gray Copper No. 3	A MC 63537	129	260
Gray Copper No. 4	A MC 63538	129	582
Gray Copper No. 5	A MC 63539	129	583
Gray Copper No. 6	A MC 63540	129	584
Gray Copper No. 7	A MC 63541	129	585
Hidden Treasure #1	A MC 63554	592	195
Hidden Treasure #2	A MC 63555	592	196
Hidden Treasure #3	A MC 63556	592	197
Hidden Treasure #4	A MC 63557	592	198

ATTACHMENT NO. 1

Name of Claim	Federal Serial Nos.	Recorded Docket	Recorded Page(s)
Reinstated #1	A MC 63528	618	631-632
Reinstated #2	A MC 63529	618	633-634
Reinstated #3	A MC 63530	618	635-636
Reinstated #4	A MC 63531	618	645-646
Reinstated #5	A MC 63532	618	647-648
Reinstated #6	A MC 63533	618	649-650
Reinstated #7	A MC 63534	618	651-652
Reinstated Fraction	A MC 63525	618	637-638
Reinstated Fraction # 1	A MC 63526	618	639-640
Reinstated Fraction # 2	A MC 63527	618	641-642
Tipperary #1	A MC 63512	618	653-654
Tipperary #2	A MC 63513	618	655-656
Tipperary #3	A MC 63514	618	657-658
Tipperary #4	A MC 63515	618	659-660
Tipperary #5	A MC 63516	618	661-662
Tipperary #6	A MC 63517	618	663-664
Tipperary #7	A MC 63518	618	665-666
Tipperary #8	A MC 63519	618	667-668
Tipperary #9	A MC 63520	618	669-670
Tipperary #10	A MC 63521	683	375-376
Tipperary #11	A MC 63522	683	377-378
Tipperary #12	A MC 63523	683	379-380
Tipperary #13	A MC 63524	683	381-382
Black Copper #1	A MC 63501	683	358-359
Black Copper #2	A MC 63502	683	360-361
Black Copper #3	A MC 63503	683	362-363
Black Copper #4	A MC 63504	683	364-365
Black Copper #5	A MC 63505	683	366-367
Black Copper #6	A MC 63506	683	368-369
Black Copper #7	A MC 63507	683	370
Black Copper #8	A MC 63508	683	371
Black Copper #9	A MC 63509	683	372
Black Copper #10	A MC 63510	683	373
Black Copper #11	A MC 63511	683	374

TELEPHONE
602-297-7281
TELEX
666-409

NEWMONT EXPLORATION LIMITED
A SUBSIDIARY OF NEWMONT MINING CORPORATION
200 WEST DESERT SKY ROAD
TUCSON, ARIZONA 85704

June 8, 1982

Mr. Richard J. Lundin
Wombat Mining Company
3425 W. Bardot Street
Tucson, Arizona 85741

Re: File No. 1340
Kelvin Prospect
Pinal Co., AZ

Dear Rich:

Thank you for accompanying me during an April 29th examination of your Kelvin property. We have just received our assay results, and these are tabulated below:

Sample No.	Au (ppm)	Ag (ppm)	Cu (ppm)	Mo (ppm)
NT-71539	<.02	0.8	1,900.	42.
NT-71540	<.02	1.4	2,900.	40.
NT-71541	.06	21.0	12,000.	140.
NT-71542	.06	0.6	2,600.	4.
NT-71543	0.22	40.0	14,000.	330.
NT-71544	.19	100.0	2,800.	38.
NT-71545	.03	2.0	165.	210.
NT-71546	.02	4.4	145.	65.
NT-71547	.03	1.2	1,150.	10.
NT-71548	.12	4.2	5,800.	55.

Rich, I regret that we cannot pursue an interest in Kelvin at this time. These assays are, however, somewhat encouraging, and certainly confirm the presence of a porphyry copper system. Unfortunately, we feel the precious metal values are too low to be of current interest.

Again, I want to thank you for bringing this property to Newmont's attention, and for contributing to a delightful and informative field day.

Sincerely yours,

Roger A. Newell

RAN:re

CORN & AHERN
CONSULTING GEOLOGISTS
8425 Desert Steppes Dr.
Tucson, Arizona 85710
(602) 298-1770

KELVIN PROSPECT

General Terms

1. Advance Royalty Payments - $20,000 on execution, $20,000 on the 1st anniversary, escalating to $25,000 on the 2nd, $30,000 on the 3rd, $40,000 on the 4th, $50,000 on the 5th and thereafter.

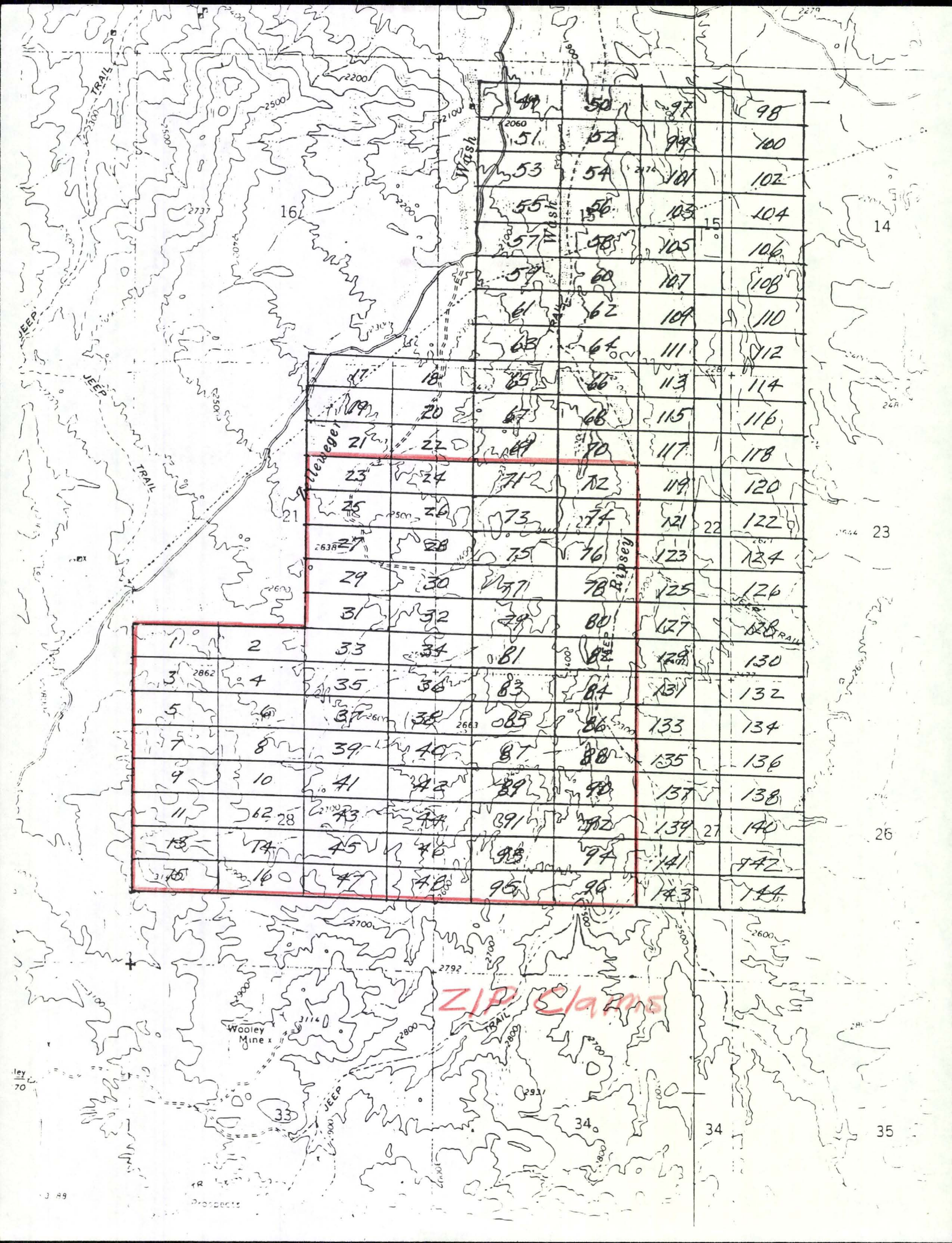
2. 5% NSR production royalty, less the amount of any Federal roalty payment, but not less than a 1% NSR royalty.

3. Payments indexed to CPI or similar index.

4. Assessment, Rental & Filing obligations.

5. Notification of termination six months prior to Sept. 1st or pay BLM rental fee.

6. Supply geologic and drilling data upon termination.



ZIP Claims
Wooley Mine
JEEP TRAIL
TRAIL
Wash
Ripsey
Prospects
16
21
28
33
34
15
22
27
14
23
26
35

Kelvin Porphyry Copper Prospect

Pinal County, Arizona

Exploration Potential:

The Kelvin prospect is a structurally-rotated porphyry copper alteration/mineralization system cut and displaced by low-angle faults similar to San Manuel-Kalamazoo with the majority of the system faulted down to the west and concealed beneath a relatively thin, structurally displaced cover consisting of shattered Precambrian granite and rotated Tertiary sedimentary rocks. Geologic data indicates that the displaced upper part of the porphyry copper system should be preserved beneath the structural cover and that there would be potential for higher-grade copper mineralization in reactive diabase and perhaps Paleozoic limestones. Geologic maps and the exposed breccia pipe at the Wooley Mine, indicate that the structural cover on the west side of Ripsey Wash may be relatively thin. Remnant, fault-bounded segments of the alteration system that are exposed near Kelvin and Riverside exhibit supergene chalcocite mineralization and a sharp zoning pattern in disseminated chalcopyrite mineralization to values that exceed .20 percent copper. Extensive oxidation and oxide copper mineralization characterize the brecciated granite at Ripsey Wash indicating the probability that oxide copper and/or chalcocite mineralization occur in the concealed alteration system at depth. The Riverside and Wooley breccia pipes have been structurally rotated to a sub-horizontal attitude and although exterior to the main alteration system, they do indicate that mineralized breccia pipes of interest should occur in the area. Exposures near Ripsey Wash represent an exterior segment of the alteration system that contains veins with interesting gold values and could have potential for a gold-bearing, structurally-rotated, sub-horizontal breccia pipe.

Land:

144 unpatented lode claims owned by Richard Ahern and Russell M. Corn in Secs 15, 21, 22, 27 & 28, T4S, R13E in the Riverside Mining District approximately 8 miles southwest of Ray.

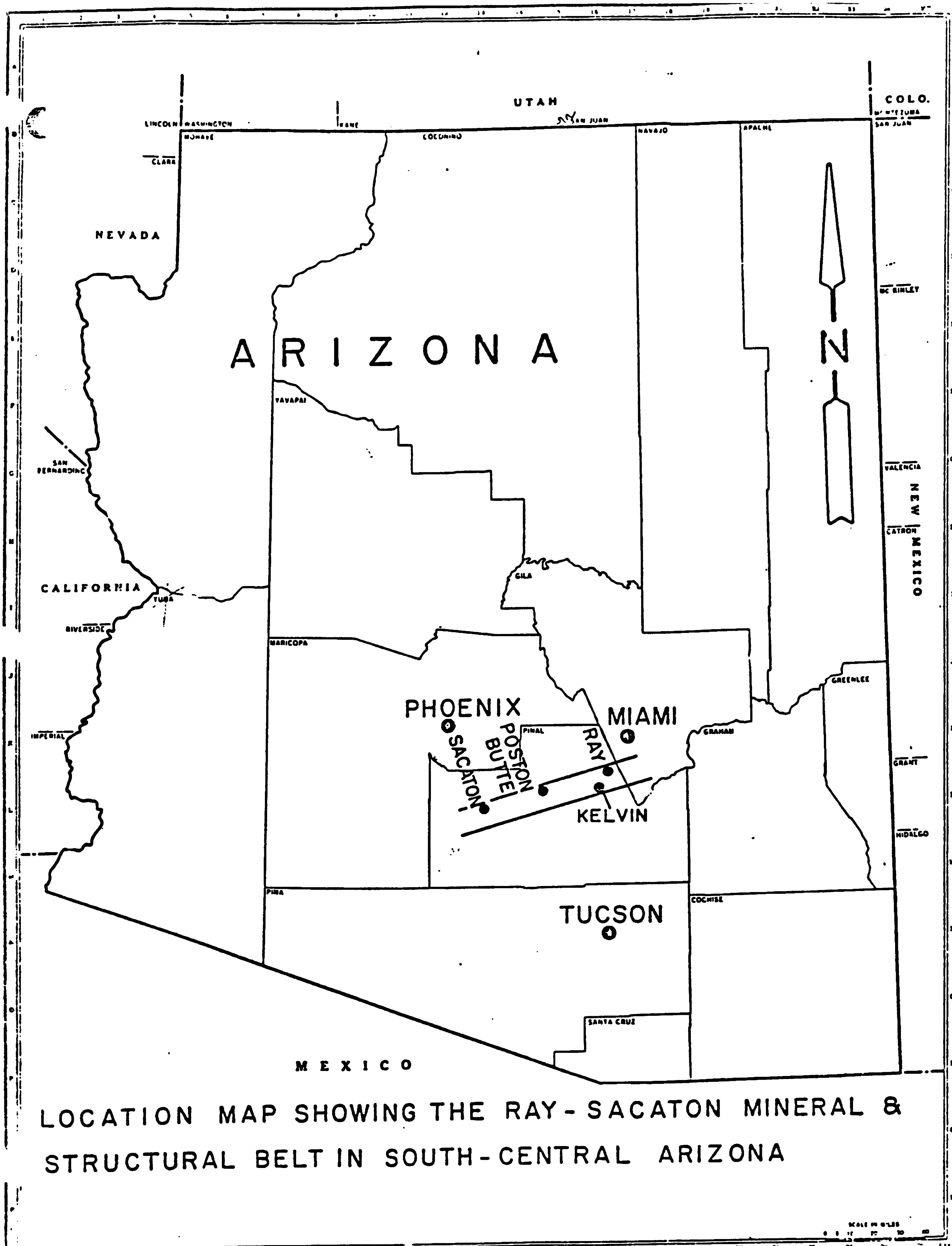
Geologic Setting:

The Kelvin porphyry copper prospect is located at the north end of the Tortilla Mountains in the structurally rotated belt along the west side of the San Pedro Valley that is characterized by near-vertical Paleozoic sedimentary rocks and associated diabase sills. The repeated near-vertical diabase sills on the west side of Ripsey Wash south of the prospect indicate displacement of the porphyry copper alteration system along low-angle faults two to three miles west of the exposures near Riverside.

Previous Exploration:

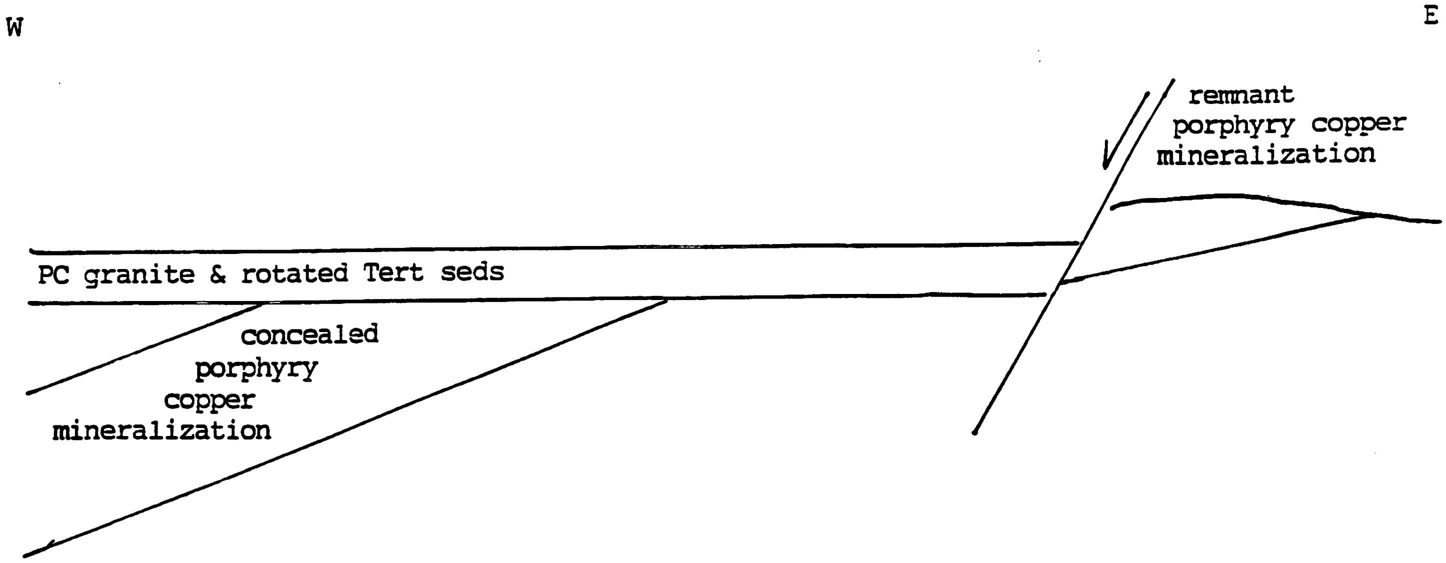
The chalcocite mineralization near Riverside was explored initially during the 1940's or earlier and since 1960 was drilled by Kennecott and Occidental. In the 1970's Kerr-McGee drilled several holes to the west on down-faulted segments of the alteration system and encountered significant primary copper values beneath unmineralized propylitic altered granite. Gulf Minerals also drilled several holes east of Ripsey Wash and encountered low-angle faults and sheared granite. In 1980 Exxon staked claims and carried out geophysical surveys near the Wooley Breccia Pipe and further south along Ripsey Wash, but there is no indication of drilling on the west side of Ripsey Wash except at the Wooley Breccia Pipe.

Prepared by R.M. Corn, April, 1992



LOCATION MAP SHOWING THE RAY-SACATON MINERAL & STRUCTURAL BELT IN SOUTH-CENTRAL ARIZONA

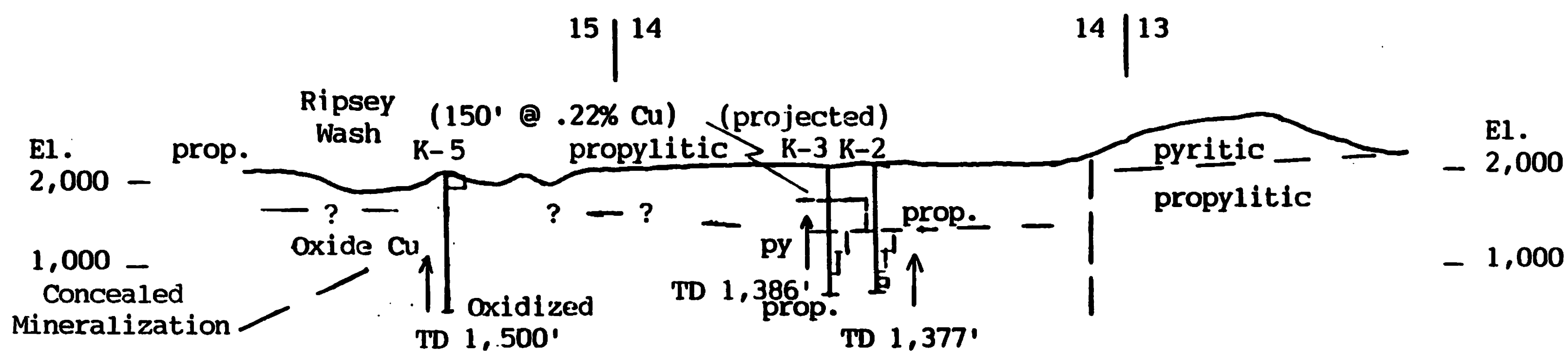
FIGURE I



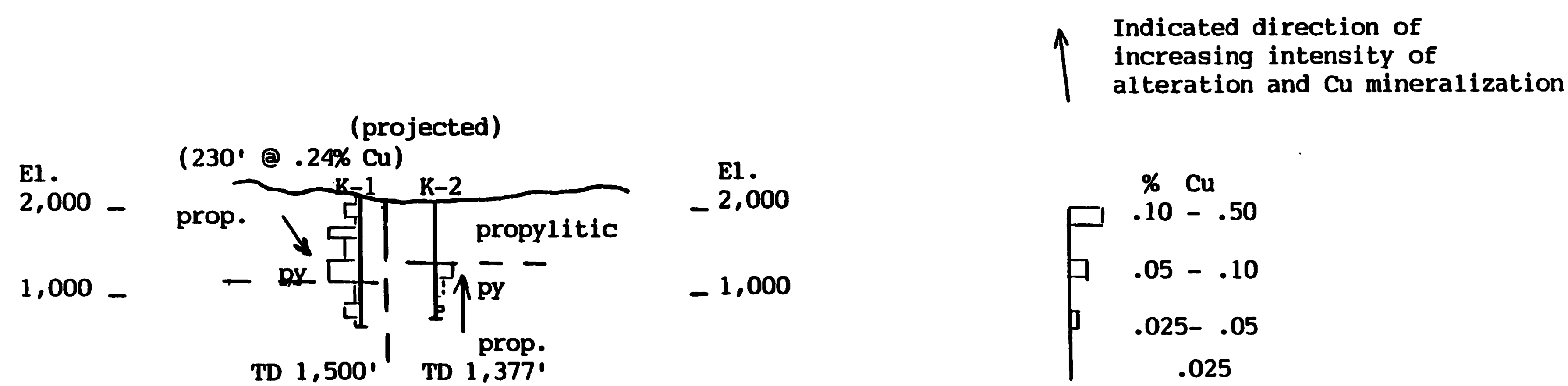
SCHEMATIC DIAGRAM

ILLUSTRATING

THE DISPLACED AND CONCEALED KELVIN PORPHYRY COPPER SYSTEM



EAST - WEST SECTION THROUGH DRILL HOLES K-2 & K-5

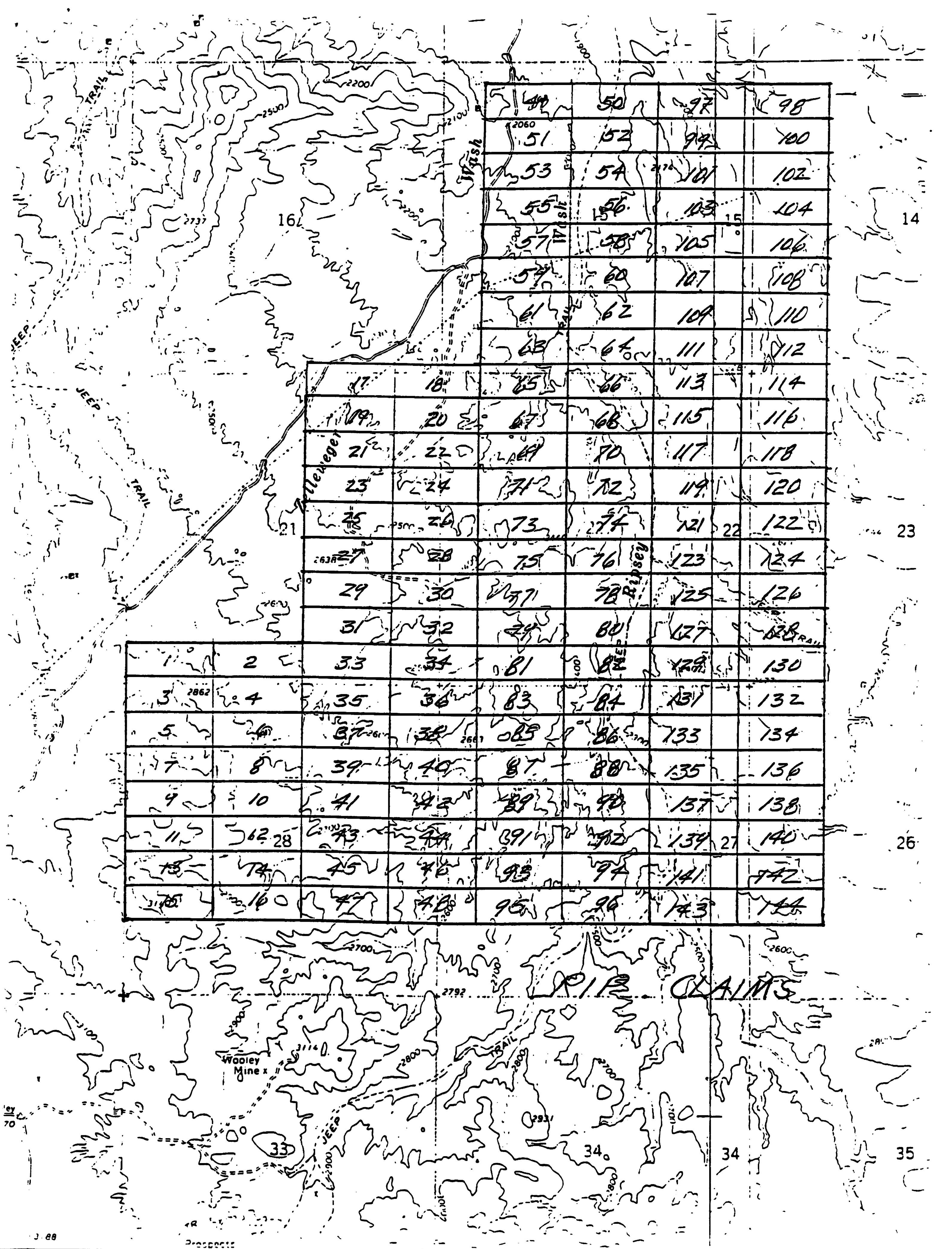


Scale: 1 inch = 2,000 feet
H = V

NORTH - SOUTH SECTION THROUGH DRILL HOLES K-1 & K-2

SECTIONS THROUGH DRILL HOLES AT KELVIN PROSPECT, PINAL COUNTY, ARIZONA

ILLUSTRATING ALTERATION AND COPPER MINERALIZATION


RIP CLAIMS
Wooley Mine x
JEEP
TRAIL
Wash
Ripsey
14
15
16
21
22
23
26
27
28
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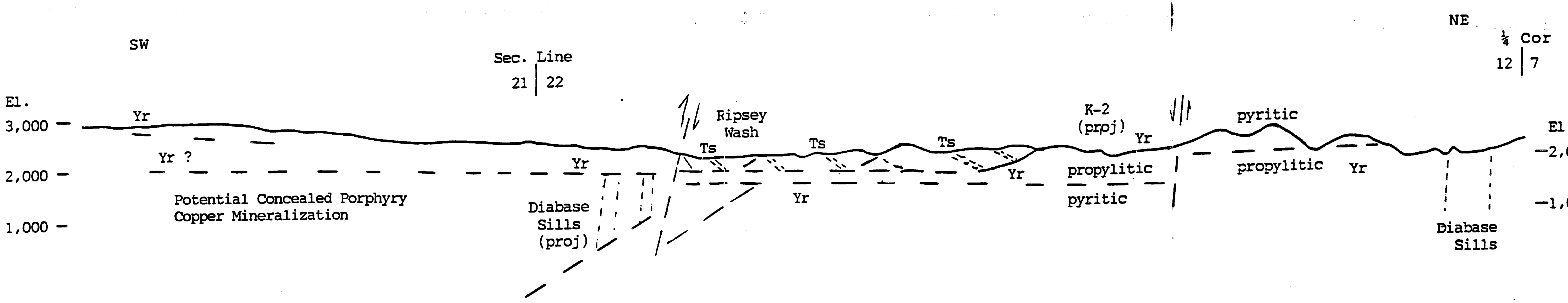
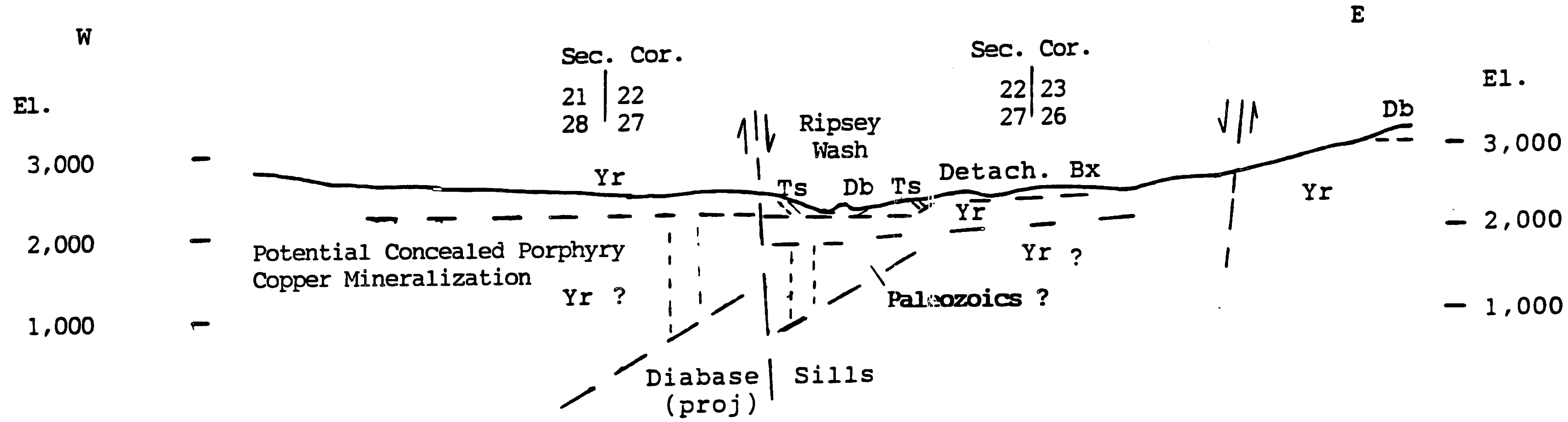
34
35
2200
2500
2060
2737
2862
2792
2700
2800
2600
3114
2931



NE - SW GEOLOGIC SECTION, KELVIN PROSPECT, PINAL COUNTY, ARIZONA

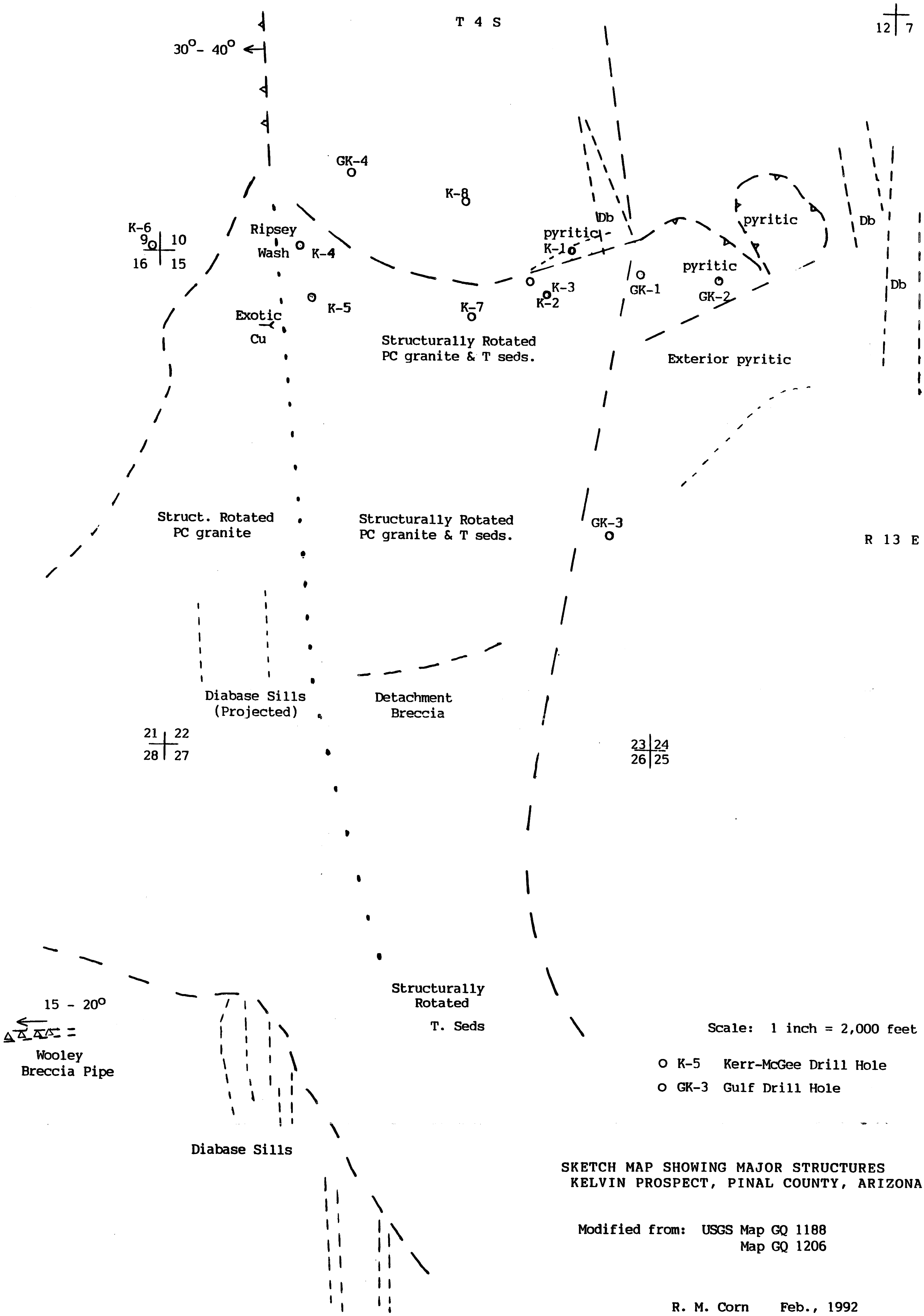


E - W GEOLOGIC SECTION, KELVIN PROSPECT, PINAL COUNTY, ARIZONA

Scale: 1 inch = 2,000 feet
H = V

Surface Geology From: USGS Map GQ 1188
GQ 1206

R. M. Corn Feb., 1992



Scale: 1 inch = 2,000 feet

O K-5 Kerr-McGee Drill Hole

O GK-3 Gulf Drill Hole

SKETCH MAP SHOWING MAJOR STRUCTURES
KELVIN PROSPECT, PINAL COUNTY, ARIZONA

Modified from: USGS Map GQ 1188
Map GQ 1206

R. M. Corn Feb., 1992

KERR-McGEE CORPORATION

District Kelvin-Riverside
Hole Number KE-1
Spudded
Completed
Total Depth 2500 feet
Driller Cyprus
Logged By

County Pinal State Arizona
Claim Johnson Sec 17 T. 4S R. 13E
Elevation
Hole Size
Core Size NX Bx
Hole Angle 60° Due North
Collar Coords. 150 ft FSL N.
150 ft FEL E.

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
10						Granite	Course grain to medium grain, light pink, with chloritized mafics; appears replaced by alteration minerals to moderate extent.	Weak potassic with fresh k-spar, cut by chlorite fractures; minor sparsely positioned magnetite blebs; some apparent pervasive silicification and approximately one quartz veinlet per foot.	Oxidized with minor remnant pyrite, chalcopyrite; sulfide content very low.
									Below 25 feet - still 80-90 percent oxidized with minor blue copper carbonates after calcopyrite. Moderately strong Mn. staining, part of which is neotocite.
								Below 30 feet - secondary magnetite along quartz-k-spar veinlets.	T.S. appears to be 1-2 percent higher in local breccia zones.
								Still 80-100 percent oxidized.	46 feet - two closely spaced pyrite-chalcopyrite veinlets, 1/8" with locally cc.
54						Snowflake Monzonite	Contact at 40° to core, (described first in bottom 500 feet). White k-spar phenocrysts, black, secondary biotite clusters in dark, grey-black aphanitic matrix.	Secondary biotite, moderate magnetite, minor quartz-K-spar veinlets.	Locally 100 percent oxicized; primarily 30-40 percent with Cu carbonates and neotocite after chalcopyrite; pyrite: chalcopyrite - 1-2:1 with disseminated and veined sulfides 1/2- 1 percent.
							61-69 feet missing		
								70 feet - Minor 1/8" quartz veinlets.	70 feet - sulfides decreased to <<1 percent with pyrite>>chalcopyrite on fractures.

District Kelvin-Cyprus | Hole Number KE-1 | Page Number 2

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
85'						Granite	Course grain with large pink K-spar phenocrysts fractured with chlorite seams.	Oxidation minor below 80 feet. Prop. - weak K with no magnetite; strong chlorite.	Below 80 feet - sparse quartz-pyrite veinlets. Little to no chalcopyrite; T.S.<<1 percent. Little to no chalcopyrite minor pyrite on quartz veinlets.
95						Granite	As above, with abundant quartz as rock grains.	Weak-strong potassic, one-3 quartz-chlorite-k-spar-magnetite veinlets per foot, moderately strong magnesium associated with chlorite clusters.	85-86 feet and 102-104 feet moderately abundant chalcopyrite, moderate pyrite, both disseminated and in quartz-k-spar veins associated with zones of stronger magnetite-chlorite alteration.
									107 feet strong quartz-k-spar and magnetite veinlets associated pyrite, chalcopyrite at 1:1 ratio.
									111 feet - 1/4" quartz-chlorite veinlets with abundant chalcopyrite in 1:2 ratio.
								112 feet - chlorite veinlet with minor secondary biotite cut by aplite veinlet.	111.5 feet aplite-chalcopyrite-tourmaline veinlet cut? by K-spar vein.
								113-115 feet - local chabazite on fractures with clay.	Minor chalcopyrite disseminated with occasional chlorite-magnetite clusters.
1195						Diabase	119.5 feet Diabase dike. 121.5 feet - cut nearly horizontally by aplite dike. Lower contact at 137 feet at 30° to core axis.	Strongly altered to magnetite-chlorite; 121.5 feet - strong carbonate veining out into aplite from diabase, diabase is cut be numerous chlorite-magnetite veinlets containing minor chalcopyrite, pyrite in 1:1 ratio. Chlorite-magnetite veinlets cut by carbonate veinlets; all plagioclase is fresh to clouded; minor secondary biotite.	

District Kelvin-Cyprus   Hole Number KE-1   Page Number 3

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
							6 feet of snowflake monzonite at contact with abundant dissem-inated sulfides.	Strong K. secondary biotite possible anhydrite, fresh spars.	Disseminated pyrite - 2-3 percent with pyrite:chalcopyrite ratio 4-5:1.
1375						Granite			
1375						Granite	As above	Abundant calcite veinlets.	
141						Snowflake mipor	As above, cut be calcite, chabazite veinlets.	As above.	Much less pyrite than at 137 feet.
146						Diabase	As above	Cut by chlorite-magnetite veinlets; in turn cut by carbonate veinlets; minor secondary biotite.	Chalcopyrite, pyrite, minor, restricted to quartz-chlorite veinlets.
									155 feet - 1/2" chlorite-carbonite-magnetite veinlet at 30° with abundant chalcopyrite below 170 feet - slight increase in disseminated pyrite and chal-copyrite; also slight increase in T.S. on veinlets; overall ave. - pyrite: chalcopyrite is 1-2:1.
								Continued strong veinlets of chlorite- minor secondary biotite; local quartz veinlets; all cut by carbonate.	195 and 200 feet - 1/4" quartz-chlorite-chalcopyrite veinlets at 30°, no pyrite.
								Quartz and carbonate vein-lets decreasing.	205 feet - 1/4" quartz-chlacopyrite veinlets at 35° with chalcopyrite and quartz in equal proportions.
									210 feet - 1/4" quartz-chlorite-pyrite-chalcopyrite veinlets at 70°.
									212-217 feet - 4 or 5 1" quartz-chlorite-massive chalcopyrite veinlets at 70-80°.
								Below 210 feet barite and calcite on fractures	221 feet - 1/2" solid chalcopyrite veinlets with 1/16-1/8" moly selvages.

District Kelvin-Cyprus   Hole Number KE-1   Page Number 4

Depth	Int.	% Core Recv	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
221						Granite	Contact at 30°.	Strong potassic alteration with local secondary biotite, quartz-k-spar veinlets, magnetite locally weak but strong in veinlets.	229 feet - 2 1/4 - 1/2" veinlets 6" apart. K-spar-quartz-chalcopyrite-minor pyrite-minor epidote. Overall T.S. very low <1 percent.
230						Granite	As above.	Weak-strong potassic alteration, strong quartz-magnetite-chlorite veinlets; one k-spar-epidote-quartz veinlet per foot, locally strong chlorite-magnetite with all feldspars fresh 238 feet local 6" section of pervasive secondary K-spar chlorite-epidote.	Locally strong chalcopyrite, pyrite on K-spar veinlets; little to no disseminated pyrite or chalcopyrite; T.S. <1 percent with pyrite:chalcopyrite 1:1-2.
									Below 238 feet - rock devoid of sulfides
									250 feet - 1/4" K-spar - chlorite veinlets at 35° with minor molybedum, chalcopyrite
								Anhydrite	250.5 feet 1/8-1/4" anhydrite veinlet with minor dissemined chalcopyrite outward from veinlet
								Secondary biotite more prominent.	258 feet - local blebs chalcopyrite.
								From 210 - calcite and barite contimes.	262 and 64 feet - 1/8" quartz-chlorite-K-spar, chalcopyrite veinlets. 268 feet - 1/4" K-spar-chlorite-chalcopyrite veinlets.
								Local chabazite with quartz.	Occasional (1 per 1-2 feet) thin quartz-K-spar veinlets carrying chalcopyrite.
2775						Diabase	Dark green-black, vfg-contact altered.	Quartz-K-spar-chlorite veinlets and chlorite-magnetite veinlets; carbonate (late) veinlets; local chabazite with quartz.	2775 - first 6" of diabase contains 5" sulfides with pyrite; chalcopyrite ratio of 1:2; below, sulfides drop to 1 percent with chalcopyrite on veinlets and vfg. disseminations with pyrite:chalcopyrite - 1:5 ratio.
2845						Granite	As above	287.5 feet -288 feet - pervasive secondary K-spar with chlorite veinlets.	One quartz-K-spar-epidote veinlet per two feet with very minor chalcopyrite.

District Kelvin-Cyprus Hole Number KE-1 Page Number 5

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
								No barite noticed 300 feet-310 feet, increased again below 310 feet.	Sulfides almost non-existent.
320								Quartz-K-spar veinlets continue.	No sulfides.
320						Granite	Intensely fractured, brecciated with broken diabase mixed with granite.	As above.	Weak chalcopyrite in diabase.
348						Diabase	Shattered	Alteration is weaker than in diabase higher in hole, less chlorite-magnetite veinlets	Little to no pyrite and chalcopyrite.
361						Snowflake Monzonite.		Argillic; no secondary biotite.	
376						Granite [Fault Zone??]	As above; intermixed with snowflake monzonite and shattered throughout.	Fault? With abundant clay, chlorite; abundant carbonate material.	Little to no pyrite and chalcopyrite.
405						Granite	Light gray, mg-cg., with no large, pink, K-spar near fault, but increasing in number with depth; still sheared fractured to 434 feet.	Quartz-veinlets, secondary near fault. Local quartz veinlets, local fresh K-spar with chlorite-magnetite but	Pyrite?? chalcopyrite on quartz-sericite veinlets; Outside of fault influence: spotty, chalcopyrite, minor pyrite.
								overall alteration is weak potassic with no strong potassic alteration; chlorite and clay-sericite dominant to 434 feet.	Little to no sulfides.

District Kelvin-Cyprus Hole Number KE-1 Page Number 6

Depth	Int.	Core Recvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
434						Grayback Gd.	Medium grain, light gray, non-prophyritic with slightly clouded plagioclase.	Potassic (?) fresh biotite, feldspars in rock with occasional K-spar veinlet.	Sulfides are 445 feet - 1/8" pyrite veinlet 450 feet - 1 1/2" quartz veinlet at 70° with 1/4" blebs molybdenum along borders of veinlet. 451 feet - 1/8" K-spar-chalcopyrite veinlet at 90°. 453.5 feet - 1/2" quartz-K-spar-pyrite-molybdenum veinlet with minor chalcopyrite.
460								355-59 feet near-vertical quartz-K-spar veinlets.	No chalcopyrite or pyrite except for pervasive K-spar replacement block at 459 feet.
460						Grayback Gd.			461 feet - 1/2" quartz-K-spar-chalcopyrite-molybdenum veinlet at 65° with pyrite; chalcopyrite = 1:1. 462 feet - 1/2" pyrite veinlet. 466 feet - 1/2" quartz-K-spar-chalcopyrite veinlet at 30° with chalcopyrite and pyrite very abundant; minor molybdenum.
								Weak potassic - strong potassic.	1-3 pyrite veinlets per foot; overall sulfides approach 1 percent with pyrite; chalcopyrite = 2:1.
							467-77 - Rock jumbled, core shattered.		No sulfides.
								Below 480 feet - local chabazite with quartz and carbonate veinlets.	Little to no pyrite or chalcopyrite.
								Below 480 feet - biotites become fresher; magnetite-chlorite locally present.	496. 5-497: moderately abundant chalcopyrite in fragment.

District Kelvin-Cyprus Hole Number KE-1 Page Number 7

Depth	Int.	Core Recvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
500									500-510 feet - minor fracturing.		500-510 feet - minor pyrite on fractures.
										516 feet - K-spar-quartz-epidote veinlet with abundant pyrite no chalcopyrite.	517 feet - The chalcopyrite-molybdenum veinlet described by Cyprus was sampled to the point of non-existence.
										Quartz and especially K-spar are almost non-existent.	
525		22701		.023	.004	.018	.024				
530								Grayback	As above.	Weak potassic with fresh, secondary biotite; moderately abundant magnetite; local chabazite (pink, radiating) on quartz-chalcopyrite veinlets.	Sulfides almost nil; very minor chalcopyrite disseminated in biotite clusters.
											549 feet - 1/8" chlorite-sericite veinlet at 35° with pyrite, chalcopyrite, molybdenum.
											552 feet - 1/4" quartz veinlet with abundant chalcopyrite, no pyrite.
										554 feet - rock looks fresher with abundant fresh secondary biotite.	
										562 feet - quartz-k-spar veinlet at 70° with no sulfides; also at 566 feet with chabazite; chlorite locally on fractures.	Local very minor chalcopyrite with interslidial quartz and biotite.
											580.5 feet - 1/4" quartz-K-spar-chabazite veinlet at 50° with minor chalcopyrite.
										Very spotty, hairline quartz veinlets.	
										594 feet - 1/4" K-spar-epidote veinlet at 30°.	Sulfides very minor to nill.
600									Rock is less fresh, less lustrous with little to no black, fresh biotite clusters	Alteration decreases in intensity; feldspars are dusted with clay, sericite; biotite altered to chlorite; magnetite is weak; local	Little to no sulfides.

District Kalvin-Cyprus Hole Number KE-1 Page Number 8

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
									With increasing depth, the rock is increasingly sheaved, granulated.	fractures contain pink, soft mineral?; also abundant pink chabazite, identified (?) by Cyprus.	
625			22702	.003	-.001	.005	.003			615 - Strong clay-chlorite alteration associated with shearing and granulation.	629 feet - shiny, black, very hard resinous grains with red halos-Brannerite?
											630 feet - local bleb of chalcopyrite in chlorite adjacent to quartz-chalcopyrite veinlet.
646								Grayback Gd.	Rock between 635 and 645 feet is lost; shearing, granulation decreases: 635-645 feet fault.	Below fault; still chlorite-clay with minor, reappearing secondary biotite.	Little to none.
									664-675 feet fault; most core is missing.	Rock below 650 feet is very fresh with abundant secondary biotite and increasing magnetite.	Little to no sulfides.
									675 feet and below: rock is dull gray-green in color due to extensive chlorite-clay alteration.	Increasing clay-chlorite-sericite.	679 feet - 1/8" chlorite-molybdenum veinlet at 20°.
										691 feet - diabase? Strong clay-sericite-chlorite alteration.	Some disseminated very fine grain molybdenum with abundant specularite?
692								Sheared vein?	692-700 feet - lost;		700-701.5 feet - specularite-molybdenum vein. Molybdenum on fractures to 712 feet.
700			22703	.039	.027	.005	.020		700-705 feet - granulated; strong fracturing to 715 feet; minor fracturing below 715.	Clay-chlorite with spec.-molybdenum fracture fillings;	
										Below 720 feet rock becomes fresh with quartz-k-spar veinlets and secondary biotite.	724 feet - 1/8" quartz-chalcopyrite veinlet at 30°.

District Kelvin-Cyprus Hole Number KE-1 Page Number 9

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
								Below 725 feet - increased clay-chlorite.	725 feet - 1/8" quartz-chalcopyrite-molybdenum veinlet at 5°. 731 - 1/16" quartz-molybdenum veinlet at 45°.
733						Oracle Gr. (?)	Intensely sheared ground-up rock.	733-750 feet; rock appears to be Oracle gr., 60-80 percent clay-chlorite with minor disseminated molybdenum.	Minor disseminated molybdenum. Below 740 feet - spotty molybdenum associated with chlorite veinlets.
								Spotty quartz-K-spar veinlets carry minor chalcopyrite; but molybdenum appears associated with chlorite.	647 feet - vertical 3" quartz veinlet with selvages of chlorite-molybdenum.
750						Grayback Gd.	Gray-green with chlorite.	Local secondary biotite with predominant clay-chlorite.	
754						Quartz, Monzonite porphyry dike.	Light gray, silicified, aphanitic dike with minor K-spar phenocrysts and very fine grain specs chlorite.	Local calcite veinlets.	
758.5						Grayback Gd.	Contact extremely broken.	Contact altered to clay. Below 764 feet - gray-green clay-chlorite with local secondary biotite.	Sulfides very minor to nill.
								770 feet - local calcite - chabazite veins; no quartz veinlets.	No sulfides.
								785 feet - local hairline K-spar veinlet, dominant calcite veinlets dipping at consistent 30°.	775 feet - 3" diabase s with minor disseminated chalcopyrite.

District Kelvin-Cyprus　　Hole Number KE-1　　Page Number 10

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
										790 feet alteration is chlorite-clay with no quartz and almost no K-spar.	No sulfides.
800			22704	.007	.001	.004	.005		800 feet intensely shattered to 818 foot fault?	800 feet - strong clay alteration of all feldspars	
									820-823 - quartz monzonite dike; abundant carbonate.		No sulfides.
825								Grayback GD.	As above.	Continued clay-chlorite very strong; occasional quartz-K-spar veinlet.	
											No sulfides.
									847 feet - sheared, shattered to 860feet, continued strong fracturing below 860.	Magnetite is weak to nil.	
879								Fault	879-883 feet - Fault Gouge.	No quartz or K-spar in veinlets.	
									900 feet shartered, sheared; gray-green	Moderately strong clay-chlorite.	
900			22695	.007	.001	.005	.015		color persists.		
912									912-916 feet - quartz monzonite silicified dike.	Strong sericite-clay.	No sulfides
											919 feet - 1" quartz-zeolite veinlet at 10° with abundant chalcopyrite, minor pyrite.
									918 feet - change to fresh secondary biotite and quartz-K-spar-zeolite veinlets in grayback.	Weak potassic alteration.	
										Very numerous quartz-zeolite veinlets; carbonate veinlets numerous.	
										936-38 feet - pervasive K-spar replacement; weak magnetite returns; increasing amounts of pink zeolite (chalcozite).	No sulfides

District Kelvin-Cyprus Hole Number KE-1 Page Number 11

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Mo			Rock Type	Rock Description	Alteration	Mineralization
950									950 - shattered, broken.		
										Below 960 feet - sharp decrease in number of quartz veinlets. 970 feet continued abundance of carbonate veinlets.	
980										980 feet - very spotty quartz veinlets.	No sulfides.
983								Grayback Gd.	Light gray with black, fresh biotite clusters.	Weak potassic with occasional quartz veinlets; local pervasive replacement of feldspars by zeolites (?).	
1025	25		22706		.002	.003	.001				No sulfides.
1035										Alteration continues much the same; minor quartz except locally.	1035 feet - minor smeared blebs of molybdenum on chlorite fracture-hairline.
											1042 feet - 1" quartz-zeolite veinlet at 30° with one 1/8" diameter bleb chalcopyrite.
1050											Very, very sparse chalcopyrite, disseminated in chlorite and magnetite, begins to appear below 1050.
										Below 1070 feet - minor quartz veinlets; continued calcite and zeolite veinlets. 1092 feet - 3" quartz veinlet with no sulfides.	
1100										Quartz veinlets carry no sulfides.	No sulfides except very minor chalcopyrite on occassional, near-vertical quartz-chlorite veinlet.
1125	25		22707		-.001	.006	.004			Most quartz-zeolite veinlets contain no sulfides.	1121 feet - pyrite-chalcopyrite bleb in 1/4" quartz veinlet at 80°.

District Kelving-Cyprus　　Hole Number KE-1　　Page Number 12

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
											1145 feet - minor chalcopyrite grains on chloritic fracture.
1151										1151 feet - first K-spar observed for serveral hundered feet; secondary biotite very fresh; no clay or chlorite except after matics.	1151 feet - 1/8" quartz-K-spar veinlet at 30° with epidote, minor chalcopyrite also at 1152 and 1154. 1159 feet - 1/4" quartz-chlorite-magnetite veinlet at 30° with pyrite, abundant chalcopyrite in pyrite:chalcopyrite ratio 1:5; average of one quartz-K-spar-chalcopyrite veinlet per every 2-4 feet.
1166								Grayback Gd.		Weak-strong potassic; increasing chalcopyrite associated with increase in K-spar and decrease in zeolites. Below 1180 feet veinlets with chalcopyrite decrease in number to 1200 feet, crystalline calcite veinlets dominant with very sparse quartz veinlets.	1169.5 feet chalcopyrite-molybdenite veinlet at 60°. 1176 feet - near horizontal quartz-chalcopyrite veinlet. 1189 feet - hairline fracture lined with chalcopyrite. 1215 feet - 1/2" quartz veinlet at 35° with minor specs. chalcopyrite.
1200											
1225	25		22708		-.001	.006	.003				1226 feet - quartz-minor chlorite veinlet with weak chalcopyrite.
1246									1246' - broken, brecciated with increased clay-chlorite fresh appearance is gone.	Biotite altered to chlorite; feldspars altered to clay.	Little to no sulfide material.
									1260 - No brecciation but chlorite-clay alteration of biotite and plagioclase continues.	Sparse K-sapr-quartz veinlets; argillic - chlorite continues at depth.	Little to no sulfides.

District Kelvin-Cyprus Hole Number KE-1

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Assays Pb	Assays Zn	Rock Type	Rock Description	Alteration	Mineralization
										1280 - local K-sapr replacement outward from hairline K-spar-quartz veins; general pervasive clay-chlorite is weak; local disseminated fresh biotite.	
								1233	Strong brecciation with inclusions? of diabase, extensively altered.	Strong, pervasive chlorite and calcite; magnetite in chlorite.	Local disseminated (minor) chalcopyrite associated with strong chlorite-magnetite clusters.
									1232-3615 feet - schist fragment; strong chlorite-magnetite.	Chlorite-magnetite-sericite.	Disseminated pyrite and chalcopyrite very minor.
1238								Grayback			
									Core lost 1233-1264-1264-1290 feet in one box - 33 percent core recovery in wedge off to Bx.		
1264									As above 1233 feet.	Alteration is weak chlorite-clay with minor quartz veinlets.	Little to no visable sulfides.
										1295 and below: local thin K-spar-quartz-epidote veinlets; biotites are much fresher; very little clay-chlorite pervasive-type alteration; some quartz-zeolite veinlets.	1295 feet - fine grain molybdenum and chalcopyrite on fracture Little to no sulfides
1300											
1325	25		22709		-.001	.005	.012				1320 feet - very fine grain specks of chalcopyrite on quartz veinlet.
										Sparse quartz-K-spar veinlets with pervasive fresh secondary biotite.	1331 feet - pyrite and chalcopyrite in 1:1 ratio in quartz-chlorite veinlet at 25°.

District Kelvin-Cyprus Hole Number KE-1 Page Number 14

Depth	Int.	% Core Recvy	Samp. No.	Assays Cu	Mo	Pb	Zu	Rock Type	Rock Description	Alteration	Mineralization
											1359 feet - 1/8" quartz-K-spar veinlet at 30° with spotty chalcopyrite, molybdenum.
											1368-69 feet - K-spar replacement with minor disseminated chalcopyrite.
										Below 1370 feet - slight increase in quartz and K-spar with associated slight increase in chalcopyrite; locally, rock is replaced by silica and K-spar.	
											Little to no sulfides.
											1408 feet - 1" quartz-zeolite veinlet with very minor fine grain specks of chalcopyrite.
1410								Grayback Gd.	As above	Weak-strong potassic.	1411.5 feet - 1/8" quartz-K-spar-pyrite veinlet, no chalcopyrite.
											Sulfides very, very minor to non-existent.
1425	25		22710		.001	.006	.002				
											1428 feet - 1" quartz-chalcopyrite veinlet at 20°.
											1434 feet - 4" quartz-chlorite veinlet at 20° with very minor pyrite.
											1438 feet - 1/16" chalcopyrite-pyrite veinlet.
										Very minor pyrite along occasional quartz veinlet; zeolites and calcite still moderately abundant.	
											1463 feet - 1/4" quartz-K-spar-chalcopyrite-pyrite veinlet with pyrite:chalcopyrite ratio 1:1.

District Kelvin-Cyprus Hole Number KE-1 Page Number 15

Depth	Int.	Core Recy	Samp. No.	Cu	Mo	Pb	Zu	Rock Type	Rock Description	Alteration	Mineralization
											1477 feet - minor pyrite on quartz-K-spar veinlet.
										Slight increase to 3-4 quartz-k-spar veinlets per foot to 1500 feet.	1482 feet - diorite fragment with disseminated very fine grain chalcopyrite.
											1482-88 feet - numerous hairline quartz-K-spar-chalcopyrite-pyrite veinlets with overall pyrite:chalcopyrite ratio of 1:1; minor specs of molybdenum.
1500										Below 1500 feet - change to moderately strong chlorite-clay alteration.	
1519	25		22711		-.001	.002	.030				Below 1500 feet - sparse quartz-K-spar veinlets with spotty chalcopyrite and pyrite.
										Chlorite-clay increases to 1534.	
1534								Oracle Granite	Course grain, porphyritic granite with large pink K-spar phenos shattered.	Strong chlorite-magnetite with chlorite along fractures in K-spar phenos.	Pyrite dominant over chalcopyrite on quartz-pyrite veinlets.
1540								Oracle Gr.	As above.	Locally magnetite veinlets and disseminated blebs; K-spar is fresh; plagioclase is altered to chlorite, clay.	Pyrite:chalcopyrite>>1:1 with very minor disseminated and veined pyrite with quartz.
											1550-60 feet - moderately abundant pyrite disseminated and on chlorite fractures; pyrite:chalcopyrite>>1:1.
										1566-and below; occurrence of quartz-K-spar veinlets with spotty pyrite, little to no chalcopyrite.	
										1880 - plagioclase continues to alter to clay, chlorite.	Pyrite on chlorite and quartz-K-spar veinlets and disseminated is dominant over chalcopyrite.
											1598-1605 - Strong biotite-chlorite magnetite-quartz with disseminated very fine grain chalcopyrite.

District Kalvin-Cyprus　　Hole Number KE-1　　Page Number 16

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Assays Pb	Assays Zu	Rock Type	Rock Description	Alteration	Mineralization
1623	33		22712		.002	.003	.002		Dark gray and pink combination of magnetite-clay and K-spar phenocrysts.	1615 - decreased amount of chlorite, clay; increased amount of quartz-K-spar-magnetite.	Increased amount of very fine grain disseminated chalcopyrite associated with increased magnetite and K-spar.
											1620-30 feet - occasional quartz-K-spar-sericite veinlet with pyrite, no chalcopyrite.
										1630 feet - increased number of magnetite veinlets.	1645 feet - 1/8" magnetite veinlet at 30° carring disseminated chalcopyrite.
											Sulfide content very low, <1 percent.
									6665-90 - sheared, broken.	Argillic alteration with locally abundant zeolites; very few quartz-K-spar veinlets, increasing downward.	K-spar-quartz veinlets carry no pyrite or chalcopyrite.
1694								Snowflake Monzonite		Occasional quartz-K-spar-epidote veinlets.	Minor chalcopyrite on veinlets; no disseminated or veined pyrite.
1700								Snowflake Monzonite	White feldspars in dark gray-black matrix.	Strong potassic with fresh biotite; chalcopyrite associated with quartz-chlorite-magnetite; occasional magnetite veinlet; magnetite also on biotite-chlorite veinlet.	Very fine grain, minor disseminated chalcopyrite and along veinlets with quartz or chlorite.
											1721 feet - 1/16" biotite-chlorite-quartz-chalcopyrite veinlet at 60°.
1725	25		22713		-.001	.031	.005				1725 feet - 1/8-1/4" quartz-zeolite-chalcopyrite veinlet at 30° with no pyrite.
										1730 - occasional quartz-K-spar veinlet.	
											T.S. 1 percent with pyrite:chalcopyrite = 1:2.
										1735 - 46 feet - core jumbled; contains numerous quartz veinlets, very few of which contain chalcopyrite.	

District Kelvin-Cyprus Hole Number KE-1 Page Number 17

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Mo	Pb	Zu	Rock Type	Rock Description	Alteration	Mineralization
1747	5							Oracle Gr.	Course grain with large, pink K-spar phenocrysts, broken fractures filled with chlorite.	Strong chlorite, fresh K-spar, minor quartz and K-spar veinlets, minor magnetite.	1749-54 feet - numerous quartz-K-spar-chlorite veinlets with pyrite, chalcopyrite in 1-2:1 ratio.
											1757 and below: increased fracturing with associated increased chalcopyrite on some fractures; quartz veinlets carry dominant pyrite so overally pyrite: chalcopyrite ratio is 2-3:1.
										Strong chlorite-pyrite on most fractures; some suggestion of K-spar dispersion (secondary)	1773 feet - 1/4" magnetite-chalcopyrite veinlet at 30°.
									Below 1785 feet - very strong shearing and fracturing with chlorite on all fractures - to 1792 feet. Again at 1802-1825 sheared, granulated.		1789 feet - 1/4" magnetite-chalcopyrite veinlet at 30°.
										Moderately strong magnetite - most feldspars altered to sericite and clay.	1793 and 1801 - quartz-magnetite veinlets with minor chalcopyrite, pyrite in 1:2 ratio disseminated chalcopyrite associated with disseminated magnetite blebs; higher pyrite in sheared zones.
1825	25		22714		.003	.008	.019				
1850								Oracle Gr.	As above, extensively sheared, granulated to 1850; below: less fracturing.	Strong chlorite-clay associated with sheared areas; below 1850-strong quartz-magnetite-chlorite alteration.	Minor disseminated and veined pyrite greater than chalcopyrite.
											Quartz-magnetite-chlorite contains moderately abundant pyrite and chalcopyrite in pyrite:chalcopyrite ratio of 2:1.
											1865-67 feet - abundant chalcopyrite on quartz magnetite pervasive alteration.
										Below 1880 - very strong chlorite-magnetite to 1890.	
										1890 - Decreased magnetite and quartz; K-spars fresh, little to no clay alt. as at 1850.	Decreased sulfides.
											Chalcopyrite locally dominant; associated with quartz, magnetite and chlorite.

District Kelving-Cyprus   Hole Number Ke-1   Page Number 1o

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
1923	25		22715		.004	.020	.001				1920 - locally pervasive quartz-magnetite with minor disseminated chalcopyrite
											T.S. very low with pyrite:chalcopyrite = 1:1.
											1939 feet.- local visable molybdenum on quartz veinlets.
									1946-60 feet - fault? Strongly brecciated and sheared; local diabase fragments with disseminated pyrite and chalcopyrite.	Strong chlorite-clay; continues below fault. Very few fresh K-spars.	
										1980 - Sharp decrease in chlorite-clay with return of fresh K-spar.	1986.5-1989 - moderately abundant molybdenum on quartz-K-spar veinlets. Minor chalcopyrite, no pyrite.
2006								Quartz monzonite to Pf. Gr.	Light gray-green, course grain, intensely altered; shattered, sheared to minor extent.	Weak potassic with abundant quartz veinlets, chlorite; no magnetite; local secondary K-spar veinleis; local dusting of K-spar and plagioclase.	Sulfides minor <1 percent, with pyrite: chalcopyrite ratio 1-2:1; minor visable molybdenum on most quartz veinlets; pyrite associated primarily with quartz-chlorite veinlets and minor magnetite.
											2018 - chalcopyrite primarily on thin, K-spar veinlets with minor quartz, possible K-spar.
									2023- locally intense shattering,breccia.	2023 - complete argillization of plagioclase; local dusting of K-spar.	
2023.5								Granite and diabase			
2025	25		22716		.004	.009	.003		Numerous 1/2-2" thin diabase dikelets at 70-80° to core axis.	2023.5-abundant chlorite; minor increase in magnetite; plagioclase completely gone to clay; K-spar seams secondarily fresh, numerous thin chlorite seams cut granite carrying chalcopyrite.	Minor disseminated pyrite, chalcopyrite in 1:1 ratio; also, occasional quartz veinlets carring pyrite, chalcopyrite in 1-2:1 ratio.

District Kelvin-Cyprus   Hole Number KE-1   Page Number 19

Depth	Int.	Core Recvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
2030								Diabase	Very fine grain - aphanitic, dark black, intensely fractured.	Sericitic-chlorite - to weak potassic with fresh feldspar faces; weakly magnetic; numerous calcite veinlets.	Slight increase to possibly 1 percent Ts. Pyrite and chalcopyrite veined and disseminated in 1:1 ratio.
									Below 2032 feet - Snow-flake appearance; light gray-white, K-spars in very fine grain matrix dark gray.	Abundant secondary biotite clusters and epidote clusters.	Locally strong chalcopyrite in 1:2 ratio with pyrite on chlorite-quartz fractures.
									Below 2038 feet - abundant pervasive carbonate.	Chlorite associated with arg. alt. of plagioclase, some K-spar; occasional quartz veinlets.	Very weak chalcopyrite dissemination.
									AT 2043 feet grades back into material as at 2030-2032.	Same as at 2030-32.	Abundant chalcopyrite in shears » pyrite.
2046								Granite	As above with fresh K-spar, clay alteration of plagioclase.	Weak potassic, weak clay-sericite; strong chlorite, quartz veining, secondary biotite or chlorite on fractures.	Moderately abundant T.S., 1-1.5 percent with 1-2:1 pyrite-chalcopyrite ratio; 2048-50 feet - near vertical quartz-K-spar-carbonate veinlets with abundant pyrite, molybdenum, chalcopyrite.
2050								Granite	As above.	Continued weak potassic with little to no magnetite locally abundant quartz veinlets with minor K-spar, chalcopyrite.	Chalcopyrite and pyrite disseminated and veined with T.S. <1 percent. Pyrite:chalcopyrite ratio is 1-2:1.
2065										Very low sulfide in strong chlorite; weak, weak magnetite; K-spar fresh.	Sulfides; chalcopyrite very minor.
											2068 feet - locally abundant quartz-K-spar veinlets carrying abundant chalcopyrite, minor pyrite.
										Below 2068 feet magentite content picking up; local magnetite-chlorite clusters after mafics; increased freshness of K-spar.	Decreased number of quartz veinlets.

District Kelvin-Cyprus Hole Number KF-1 Page Number 20

Depth	Int.	Core Recy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
2080										Continued abundance of calcite filling vugs; 2-3quartz-K-spar-chalcopyrite veinlets per foot.	Chalcopyrite>>pyrite on veinlets; disseminated pyrite>>chalcopyrite; overall average 1:1 pyrite: chalcopyrite with <<1% T.S.
2090										Continued increase of magnetite to 2095.	
									2095 feet - Strong shattering and shearing with chlorite, calcite on fractures.	Clay-chalorite; decreased magnetite; continued abundance of quartz-K-spar veinlets; continues with moderate sericite to 2123.	Minor chalcopyrite, pyrite disseminated and on veins; T.S. <<1 percent.
2110	10		22717	.044	.002	.007	.004				
2120	10		22718	.036	.001	.005	:007		2123-2135 - no shearing.		
2130	10		22719	.047	.002	.005	.003				
2135									2135 feet - shearing increases again.	Clay-chlorite-quartz-dominant alteration.	2151 - 1" quartz-carbonate-K-spar vein with abundant molybdenum.
2140	10		22720	.030	.007	.004	.002				
2150	10		22721	.033	.003	.003	.017	Granite	Course grained, fractures, partially sheared with chlorite on all fractures.	Weak pot. to prophyry with magnetite, chlorite, clay occasional quartz veinlets.	2152 feet - locally abundant chalcopyrite, no pyrite on fractures.
2160	10		22722	.032	.008	.004	.002				Occasional chalcopyrite bleb on quartz veinlets.
											Pyrite:chalcopyrite overall - 1:1-2
2170	10		22723	.033	.001	.004	.002		Continued fracturing	Abundant carbonate veinlets.	
2180	10		22724	.029	.003	.005	.009		Below 2180 - fresher appearance to rock; dark green-black with clay.	Strong chlorite on fracture; abundant quartz veinlets; little to no magnetite.	2196 feet - 1/4" K-spar -chalcopyrite veinlet.
2190	10		22725	.042	.014	.006	.001				2188-95 feet - local thin quartz-K-spar-molybdenum veinlets with spotty chalcopyrite; also, occasional thin, hairline quartz-chlorite-chalcopyrite veinlets.

District Kelvin -Cyprus   Hole Number KE-1   Page Number 21

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Mo	Pb	Zn	Rock Type	Rock Description	Alteration	Mineralization
2200	10		22726	.053	.002	.005	.001			Definite increase in number of quartz and quartz-K-spar veinlets.	2200 feet - 1/8" chalcopyrite veinlet at 30°.
2210	10		22727	.066	.005	.004	-.001			2210 feet - weak, minor magnetite with chlorite clusters.	T.S. <1 percent mostly on quartz veinlets as pyrite, chalcopyrite in 1:2 ratio.
										2212 - local epidote clusters.	
2220	10		22728	.026	.005	.005	-.001				2216feet - 1/4" quartz-molybdenum veinlets at 45°.
2230	10		22729	.053	.003	.003	-.001			Weak magnetite continues.	2225 feet - 1/2" quartz-K-spar veinlets at 60° with abundant chalcopyrite.
2240	10		22730	.039	.007	.003	-.001			2-4 Quartz veinlets with minor K-spar per foot, occasional K-spar veinlet with minor chalcopyrite.	Minor chalcopyrite and pyrite on veinlets.
2250	10		22731	.030	.002	.004	.001				
2260	10		22732	.068	.002	.003	.003				2262 feet - 1/8" chalcopyrite veinlet at 60°.
2270	10		22733	.131	.003	.004	.005				
2278								Granite and diabase.	Cotact at 10°, interspersed dikes of diabase in granite.	Intense chlorite, weak potassic alteration, abundant calcite veinlets.	Increased chalcopyrite on fractures with quartz, minor pyrite.
2280	10		22734	.066	.001	.005	.003				Sparse but predominant chalcopyrite to 2285.
2283								Granite	Contact at 0° to core axis.	Weak potassic.	Weak, spotty chalcopyrite and minor pyrite to 2300.
2290	10		22735	.082	.001	.005	.003				
2300								Granite		Weak potassic with increasing clay-sericite and decreasing magnetite below 2300 to 2310.	
										2310 - increased quartz veinlets with K-spar veins containing minor chalcopyrite, epidote; numerous quartz veinlets.	Minor chalcopyrite; pyrite:chalcopyrite ratio is 1:2-3 with <1 percent T.S. Moderately abundant molybdenum on quartz-K-spar veinlets; minor spots of chalcopyrite

District Kelvin-Cyprus Hole Number KF-1 Page Number 22

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
2325							Rock continues to be shattered, part brecciated with chlorite, minor very fine grain pyrite on fractures - (hairline and numerous)	Continued weak potassic alteration with local magnetite-chlorite blebs with chalcopyrite disseminated within; quartz-K-spar-molybdenum veinlets decreasing in abundance	Minor disseminated pyrite and chalcopyrite in 1:1-2 ratio with T.S. <<1%.
									2332 feet - abundant molybdenum on fracture filled with K-spar, carbonate.
							Occasional 1"-2" section of diabase with secondary biotite.	2346 feet - carbonate material remains abundant through lower part of hole	2333-37 feet - strong quartz-K-spar veining with minor molybdenum, chalcopyrite, sparse pyrite.
2346						Monzonite (Snowflake)	Snowflake appearance; large white K-spar phenos and round quartz grains in dark gray very fine grain-aphantic matrix, shattered.	Secondary biotite prominent with moderately abundant quartz veinlets, minor blebs of epidote; strong magnetite.	Disseminated pyrite 1-2 percent, decreasing downward; chalcopyrite in quartz veinlets and disseminated, increasing downward. Pyrite: chalcopyrite overally 1-2:1; minor very fine grain molybdenum specks on all quartz veinlets.
									2310 feet - near vertical chalcopyrite-molybdenum alteration 1/16" thick.
								2365-66 feet - local spec. veinlets with possible(?) molybdenum.	2269-70 feet - 1/2" Near-vertical quartz-K-spar-pyrite-molybdenum veinlets.
								Minor K-spar appears on quartz veinlets; local blebs of epidote to 2380.	Numerous thin, hairline chalcopyrite-quartz veinlets; T.S. have dropped-mostly a drop in disseminated pyrite, associated with change to pyrite: chalcopyrite ratio of 1:2-3.
2380						Snowflake Monzonite	As above.	As above; 1-3 or more quartz veinlets per foot with K-spar, strong chlorite-magnetite.	Quartz-K-spar veinlets all carry molybdenum and chalcopyrite; very little pyrite. Also a second system of quartz-chlorite veinlets with strong chalcopyrite.

District Kelvin-Cyprus Hole Number KE-1 Page Number 23

Depth	Int.	Core Recy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
							2396-97 feet - gradational contact.	2396 feet - possible anhydrite in vein of K-spar	Below 2389 - moderately abundant chalcopyrite, both disseminated and veined; with moderately abundant molybdenum; could approach .25-35 percent.
2397						Granite	Course grain, light gray, with large light pink K-spar phenos.	Magnetite is much weaker; and secondary biotite, strong quartz K-spar veining continues with minor magnetite in quartz veinlets 2405-07 feet.	Local 2-4" zones with 1 percent or more disseminated chalcopyrite; pyrite; chalcopyrite ratio is 1:1-2 with T.S. less than 1 percent.
									2410-14 feet - abundant K-spar-quartz veinlets with locally strong chalcopyrite; minor molybdenum, pyrite.
							2420-22 feet diabase dike.	2419.5-20 feet- K-spar-epidote quartz replacement.	2420-22 feet - numerous quartz (14") veinlets with abundant chalcopyrite.
								2430 - magnetite is weak to non-existent; K-spar quartz remains abundant, but as pervasive type alteration rather than in veinlets.	Minor veined pyrite, chalcopyrite in 1:2 ratio. Total sulfides <1 percent.
								2440 - extensively sheared broken, with loss of pervasive silica and increasing chlorite-clay.	Weak, very minor disseminated pyrite and chalcopyrite with pyrite:chalcopyrite ratio 1-3:1.
								2450 - quartz-K-spar veinlets average 1-3 per foot.	Little to no sulfides on veinlets.
							2467-79 feet fault breccia		2463 feet - 1/4" quartz-K-spar veinlet, near vertical, with abundant chalcopyrite.
2469						Diabase	(?) dark black, intensely altered.	Potassic alteration	Abundant veining chalcopyrite-pyrite.

District Kelvin-Cyprus Hole Number KE-1 Page Number 24

Depth	Int.	Core Rcvy	Samp. No.	Assays Cu	Mo			Rock Type	Rock Description	Alteration	Mineralization
2469								Diabase	Dark gray-black, aphanitic.	Potassic with carbonate veinlets.	Chalcopyrite decreases slightly with depth. Pyrite is minor to non-existent and increases slightly with depth. 2485-2500 feet - interspersed diabase and snowflake monzonite with weak chalcopyrite on quartz-K-spar veinlets and carbonate veinlets.
2500									2500 feet is bottom of hole!		

KERR-McGEE CORPORATION

District Riverside-Kelvin
Hole Number K-1
Spudded 7-1-72
Completed
Total Depth
Driller Joy Mfg. - B. Gardiner
Logged By D. A. Wolfe

County Pinal State Arizona
Claim Keri 17 Sec 11 T. 4S. R. 13E
Elevation 2100'
Hole Size
Core Size NC
Hole Angle Vertical
Collar Coords. 150 ft. FSL N.
1400 ft. FEL E.

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
0						Quartz Monzonite	Coarse-grained biotite quartz-monzonite; locally fractured, sheared.	Weak potassic characterized by fresh K feldspar; mafics and fresh, secondary(?) biotite altered to chlorite, magnetite; supergene clay-sericite alteration of plagioclase and chlorite to sericite; 90-100% oxidized to 20'.	Limonite after pyrite, chalcopyrite; total sulfide at 1%; pyrite:chalcopyrite ratio = 2-3:1. Below 18' - Minor relict chalcopyrite, 70-80% replaced by covellite; local weak chalcocite coatings on relict pyrite.
20	20	100%	21962	.051			Shearing, fracturing more prominent; rock to minor degree is granualted.	Minor oxidation, mafics, biotite altered to chlorite, magnetite; and gypsum on shear planes to 29', supergene(?), local chlorite on fractures; quartz veinlets abundant; plagioclase and chlorite still altered to sericite, minor clay.	Disseminated pyrite, chalcopyrite in pyrite, chalcopyrite ratio of 1-2:1, chalcopyrite locally 50-75% replaced by covellite; local chalcocite, weak. Total sulfide less than 1%. 29' - Massive molybdenum-sericite veinlet at 30°.
30	10	100%	21963	.116					30' Very fine-grained chalcopyrite blebs in chloritized mafics.
33						Shear	Steeply dipping at 20° rock is intensely fractured, granulated.	Intense clay-sericite-chlorite alteration of all minerals except quartz; local specularite; locally fresh biotite and K feldspar where shearing is minor.	Increased total sulfide to 1-2%; pyrite; chalcopyrite = 1-2:1; little to no supergene copper.
40	10	90%	21964	.092					
43						Quartz - Monzonite	Still fractured to 51' gray-green chlorite-sericite fractures.	Argillic-sericite alteration of plagioclase and sericite; partial destruction of K feldspar.	Total sulfide remains high 2-3% in 2-3:1 pyrite:chalcopyrite ratio to 51'.
50	10	100%	21965	.086					

District Riverside - Kelvin

Hole Number K-1

Page Number 2

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
50						Quartz-Monzonite	Coarse-grained monzonite with large K-feldspar phenocrysts; numerous thin shears on fractures at 0-5° filled with clay.	Weak potassic with fresh K-feldspar, magnetite, chlorite, local blebs fresh biotite; supergene clay-sericite.	Very minor disseminated pyrite and chalcopyrite in 2-3:1 ratio. 52' 8" quartz veinlet with associated strong brecciation and sericitization of host monzonite; abundant pyrite and chalcopyrite in 1:1 ratio.
60	10	100%	21966	.082				59' Local weak carbonate filling fractures. 60' - Biotite blebs minor to chlorite. Plagioclase remains altered to clay, sericite.	62' - 1/2" quartz-sericite-pyrite veinlet at 70° with chalcopyrite. 63' - 1" veinlet at 40° -quartz-sericite-pyrite-chalcopyrite. 66.5' - 1" veinlet; 69' - 4" veinlet, both quartz-sericite-pyrite-chalcopyrite. 62-67' - Veinlets carrying 90-100% of sulfides in pyrite:chalcopyrite ratio 5-10:1; little to no disseminated pyrite or chalcopyrite.
70	10	100%	21967	.035			As above; K-feldspar phenocrysts 1-2" on C-axis.	Decreasing argillication of plagioclase; local fresh plagioclase faces.	70-80' - Approximately 1" quartz and sericite as above with pyrite, minor chalcopyrite; 98% of sulfides occur in quartz veinlets.
80	10	100%	21968	.017			Increased shearing, fracturing.	Increased clay-sericite alteration of plagioclase; little to no fresh biotite; magnetite still moderately strong.	Very fine-grained minor disseminated pyrite and chalcopyrite associated with fracturing.
90	10	100%	21969	.019				90-95' Local carbonate material on fractures.	
100	10	100%	21970	.017			99' - Increasing number of shear planes at 10° and 80-90° with abundant chlorite: 10-30 per foot.	Abundant chlorite-clay with minor sericite on fractures. 103-108' - Tightly spaced fractures at 5° with clay fillings.	95-100' - Local disseminated chalcopyrite very minor; no disseminated pyrite. 100' - Chalcopyrite increases with increased shearing but appears somewhat disseminated.
110	10	100%	21971	.02		NOTE: Change in assays from geochemical to quantitative.			

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
110						Quartz Monzonite	110-115' Less sheared, broken than below; coarse-grained quartz monzonite with large (1-2") K-feldspar phenocrysts; fracture planes at 80° contain no chlorite.	Weak potassic, fresh K-feldspar; chlorite-magnetite; local argillization of plagioclase.	One quartz-sericite-pyrite veinlet per foot bearing little to no chalcopyrite; dips at 40-50°, very minor disseminated pyrite, chalcopyrite.
115									
						Shear	Intensely sheared, brecciated.		
120	10	100%	21972	.02				Strong sericite-clay with carbonate on shears.	Moderately abundant pyrite, weak chalcopyrite on shears, fractures.
120.5									
						Diabase stringer	Dark grey to black, aphanitic; intensely shattered.	Chlorite-clay replacement of rock.	
123									Sericite-clay-pyrite veinlets 1/16 to 1/8 inch.
						Quartz-Monzonite	As above.	Oxidized near contact; weak potassic with strong clay alteration of plagioclase;	
124									
							Breccia associated with quartz-pyrite veinlets.	124-128' - Numerous quartz veinlets with abundant associated sericite.	124-128' 1/2-1" quartz-pyrite-sericite veinlets with abundant pyrite, chalcopyrite in 2:1 ratio; increased total sulfide to 1-2%.
128'							Loss of shearing, brecciation.	Weak potassic; little to no argillic alteration of plagioclase.	
130	10	100%	21973	.04			130' 6" diabase stringer; shattered, recovery 50%.	Below 129' - in quartz-monzonite: weak potassic; carbonate veinlets 1/16 to 1/8 inch at 30°.	Locally strong quartz-sericite veinlets with abundant chalcopyrite; minor pyrite; no disseminated sulfides. 134' - Granulated quartz-pyrite-sericite veinlet, moderate molybdenum.
140	10	100%	21974	.10					138 & 140'- 4-6" quartz-sericite-pyrite-chalcopyrite veinlets with abundant molybdenum at 30° to core; chalcopyrite is abundant; pyrite:chalcopyrite ratio = 1-2:1.
145							Fracturing, shattering increases to shear zone at 148 feet.	Below 140' Moderately pervasive sericite and chlorite-clay alteration develop; K-feldspar remains fresh.	
150	10	100%	21975	.09					Total sulfide in fractured zones below 148' are 1-3%. Pyrite:chalcopyrite = 3-4:1.

District Riverside - Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
150						Quartz-Monzonite	Continued shattering, shearing to 152'.	As above; moderate-abundant magnetite on fractures at 152'.	152' - Abundant chalcopyrite pyrite on quartz-sericite-breccia veinlet.
153							Little to no shearing below 153'.	Argillization of plagioclase is weak; strong chlorite-magnetite with some fresh biotite; fresh K-feldspar.	Below 153' - two veinlets per foot - quartz-pyrite-sericite with moderate copper, dipping @ 50-60°, total sulfide 2% with 1-2:1 pyrite:chalcopyrite ratio.
160	10	100%	21976	.15					Chalcopyrite, pyrite restricted to fractures @ 160'; 1/2" quartz-sericite-chalcopyrite veinlet @ 30° with moderately abundant tetrahedrite.
170	10	100%	21977	.05					169-171' - Local molybdenum blebs 1/4 to 1/2" in diameter. 177' - 4" quartz-sericite veinlet at 30°, abundant chalcopyrite, minor pyrite; moderate molybdenum; minor specularite.
180	10	100%	21978	.10			Major fracture system at 75° to axis; contains no chlorite.	Weak potassic with weak clay alteration of plagioclase; fresh plagioclase faces appear below 183'.	187.5" - 21/2" quartz-sericite-pyrite veinlet.
190	10	100%	21979	.04					189' - 2" quartz-sericite-chlorite veinlet with abundant pyrite, minor chalcopyrite and magnetite; also at 191', both at 35° to core axis.
							Well shattered 194-197'.	Increased clay-chlorite-sericite on fractures, shear planes. Locally minor carbonate persists on fractures; sericite halos from quartz-sericite veinlets entered 6-8" into monzonite.	
200	10	100%	21980	.10			Fracturing decreased from 197' but still prominent with gray-green clay-chlorite coatings.		200' 6" brecciated pyrite veinlet with minor chalcopyrite. 205' Quartz-chalcopyrite-magnetite veinlet; magnetite is very fine-grained aggregates, 1/2" veinlet at 50°. 208' 1/2" quartz-chalcopyrite-molybdenum veinlet. Molybdenum appears intergrown with magnetite.
210	10	100%	21981	.17					

District Riverside - Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
210						Quartz-Monzonite	Very coarse-grained-monzonite with large (1-2")K-feldspar phenocrysts. 216-218' - Near-vertical shearing.	Weak potassic with fresh K-feldspar, magnetite, chlorite; locally fresh biotite 211.5-213'. Quartz-sericite-chlorite veinlets appear brecciated.	211' - 2" Quartz-sericite-chlorite breccia veinlet with pyrite much greater than chalcopyrite. 213-214.6' - 1/8" near vertical sericite-chlorite veinlet with abundant pyrite, chalcopyrite in 2-3:1 ratio. 215' - 2" quartz-sericite veinlet with pyrite, chalcopyrite and minor magnetite.
220	10	100%	21982	.07					219' Pyrite-sericite veinlet; 2" at 30° with abundant magnetite, chalcopyrite, molybdenum intergrown, numerous quartz fractures to 223' carry minor pyrite, chalcopyrite.
230	10	100%	21983	.04			223' Increased fracturing and shearing with almost complete loss of rock texture to 231'.	Increased clay and chlorite in rock and on fractures; numerous quartz veinlets; plagioclase and part of K-feldspar altering to chlorite.	223' Increase total sulfide to 2-3%; pyrite:chalcopyrite ratio = 5-6:1.
240	10	100%	21984	.04				To 242' - Increased clay-chlorite-magnetite.	Abundant pyrite with chlorite and clay; little to minor chalcopyrite.
250	10	100%	21985	.03					248.6' - 2" quartz-pyrite-sericite veinlet at 40° with minor chalcopyrite.
253							Below 253' - Little to no shattering, fracturing; granitic texture returned.	Still major chlorite-clay alteration; overall alteration is weak potassic with predominantly fresh K-feldspar.	254.5' - 1/4" quartz-sericite-pyrite veinlet with very minor chalcopyrite.
260	10	100%	21986	.08			8" fault gouge to 260'.	Heavy clay-alunite(?) alteration of plagioclase above and below fault.	Pyrite veinlet 1/8" dipping at 30° in fault gouge.
266								266' - Decreasing clay-chlorite alteration; closely spaced fractures to 273' contain carbonate (vertical).	Numerous near-vertical quartz-pyrite-magnetite veinlets carry chalcopyrite in pyrite:chalcopyrite ratio of 2-3:1. Little to no disseminated pyrite or chalcopyrite.
270	10	100%	21987	.03					

District Riverside - Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
270						Quartz-Monzonite	Coarse-grained, light pink with persisting large K-feldspar phenocrysts.	Quartz-pyrite veinlets locally invade host rock in pervasive type alteration. 277-280' - Local fresh, secondary biotite.	273.5'-Quartz-magnetite-pyrite veinlet with minor chalcopyrite; local, thin pyrite stringers with chlorite.
280	10	100%	21988	.04			Shearing, fracturing similar to 220-250'.	Below 280' - Increased clay-chlorite on abundant fractures.	277' - Pyrite-sericite veinlet at 70° also at 279', both 1/4" thick. 284-285' - 1 1/2" quartz-magnetite-pyrite veinlet at 10-15° with minor chalcopyrite.
290	10	100%	21989	.04			Below 297' shattering decreases.	Chlorite-clay alteration continues to 302'.	287.5'-288.5' - 1/4" pyrite veinlet with minor chalcopyrite at 5-10°. 296' - 1/4" magnetite-hematite-carbonate veinlet at 40°. 297-298' - Quartz-pyrite-chalcopyrite-magnetite veinlet, 1/4" at 30°.
300	10	100%	21990	.05					299-300' - 1/2" quartz-pyrite-chlorite veinlet at 25°.
302							No shattering, fracturing; rock turns from light grey to pinkish-white; strong granitic texture.	Weak potassic alteration; fresh K-feldspar; relict plagioclase faces; chlorite, magnetite; local quartz-sericite veinlets; some fresh biotite.	Quartz-sericite veinlets carry pyrite and minor chalcopyrite. 306-308' Numerous quartz-sericite-pyrite veinlets with very minor chalcopyrite.
310	10	100%	21991	.03				316' - 1/4" quartz-magnetite veinlet.	313-315' - Some local fracturing with associated pyrite, minor chalcopyrite.
320	10	100%	21992	.01					319' - Near vertical 1/16" quartz-pyrite-chalcopyrite veinlet. 322,324,325' - Thin quartz-sericite-pyrite-chalcopyrite veinlets. 328' - Large blebs disseminated chalcopyrite, very local occurrence.
330	10	100%	21993	.03					

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
330						Quartz-Monzonite		Weak potassic with local, minor silica flooding.	332' - 2" quartz-pyrite-sericite veinlet at 5°, minor magnetite chlorite, also at 334' at 80°.
340	10	100%	21994	.07				345-347' - Abundant carbonate.	338-339' - Quartz-chalcopyrite-molybdenum veinlet, 1/8-1/4" at 5°.
350	10	100%	21995	.02			Below 352' - Increased fracturing, shattering.	Very weak clay alteration of plagioclase. Local carbonate material, clay alteration of plagioclase increases with increased fracturing, chloritization.	347-348' - Chalcopyrite migrating along fracture away from quartz-pyrite-chalcopyrite veinlet. 350-352' - Near-vertical quartz-pyrite veinlets, strong sericite, minor chalcopyrite. 352-353' - 1/4" pyrite veinlet with associated quartz-sericite.
360	10	100%	21996	.03			362' - Sharp drop in amount of shearing and fracturing.		369' - Two 1/4" pyrite veinlets at 20° three inches apart; pervasive sericite extends between the two; very minor chalcopyrite.
370	10	100%	21997	.04				373-380' - Locally fresh, secondary biotite.	373' - 1/4" pyrite-chalcopyrite veinlet.
380	10	100%	21998	.04				380' - Carbonate veinlet.	376-378' Thin 1/16" quartz-chalcopyrite veinlets and 1/4" pyrite veinlet.
382							Pervasive silicification with magnetite destroys original rock texture.	382' Relatively pervasive silicification with minor magnetite, chlorite and major sericite.	Fractured, broken, 2-3% total sulfide, locally with 3-5:1 pyrite:chalcopyrite ratio; disseminated.
390	10	100%	21999	.17			Increasing grey-green chlorite to 395'.	389' Locally strong carbonate veinlets with continued strong quartz-sericite-magnetite.	390' - 1/4" near-vertical chalcopyrite-quartz-magnetite veinlet. 396-397' - 1/4" chalcopyrite-magnetite veinlet at 40°.
400	10	100%	22000	.16					
401							401' - Loss of pervasive quartz-sericite-magnetite; rock has granitic texture.	Weak potassic with quartz veinlets.	401' - 1/8" quartz-molybdenum-chalcopyrite veinlet.
405								403' Quartz-pyrite veinlet with some secondary Kfeldspar.	403' - Quartz-pyrite-molybdenum-chalcopyrite.

District Riverside-Kelvin　　　Hole Number K-1　　　Page Number 8

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
405						Quartz-Monzonite		Weak potassic. 406' - Near-vertical carbonate veinlet.	405' - 2" granulated, brecciated quartz-feldspar-magnetite-pyrite veinlet with molybdenum rimming veinlet; minor chalcopyrite.
410	10	100%	21026	.18					406-408' - Strong quartz-chalcopyrite veinlet; also at 409.5-410.5'. 412' - 1/8" quartz-pyrite-chalcopyrite veinlet at 25°; chalcopyrite dominate; no disseminated sulfides.
							418' - Loss of texture due to alteration.	418' - Change from clear-weak potassic to dirty grey rock with pervasive quartz-magnetite-chlorite alteration.	412-418' - Chalcopyrite veinlets; pyrite:chalcopyrite ratio 1:2-3.
420	10	100%	21027	.14				419' & 421' - Secondary feldspar in quartz-magnetite veinlets; contains minor calcite and CaF_2.	419 & 421' - Pyrite, chalcopyrite and minor molybdenite. Also at 424-425'
							428' Granitic texture returns.	428' Weak potassic with abundant magnetite.	428' - Magnetite-chalcopyrite.
430	10	100%	21028	.09				429'- 6" pervasive secon-dark K-feldspar replacement.	428.5-429' Quartz-molybdenite-chalcopyrite-magnetite veinlet at 20°. 430' - Quartz-pyrite-chalcopyrite veinlet at 40° with pyrite:chalcopyrite ratio of 1:2-3. No disseminated sulfides.
								434' - Sharp increase in clay-chlorite coatings on fractures.	434' - Sharp decrease in quartz-veinlets and copper.
439						Diabase Dike	Dark grey, aphanitic, intensely shattered.	Strong chlorite, clay alteration; some carbonate material.	Occasional quartz-pyrite veinlet.
440	10	100%	21029	.05					
444	5	60-80%				Quartz-Monzonite	Coarse-grained with large, pink K-spar phenocrysts.	Weak potassic; little to no clay alteration of plagioclase.	

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Mo			Rock Type	Rock Description	Alteration	Mineralization
444								Quartz-Monzonite		445' - Minor carbonate on veinlets. Increased amount of fresh secondary biotite along with chlorite, magnetite. 449' - Sericite halo on veinlet varies 1/8"-1" in thickness; similar veinlets at same dip average one veinlet per foot.	445' - 1" quartz-sericite-pyrite-chalcopyrite veinlet at 35°; pyrite:chalcopyrite ratio 2-3:1; also at 446'; no disseminated pyrite or chalcopyrite; occasional thin, healed fracture with chalcopyrite. 449' - 1/4" quartz-sericite-pyrite veinlet at 30°.
450	10	100%	21030	.09					457-460' - Pervasive silicification; loss of granitic texture.	Sericite halos on quartz-pyrite and chalcopyrite veinlets; pervasive alteration is weak potassic; minor carbonate on near-vertical fractures.	455' - 1/4" magnetite-chalcopyrite veinlet at 40°.
460	10	100%	21031	.09						468' - Local fine-grained disseminated epidote with chlorite-magnetite clusters.	460' - Quartz-chalcopyrite-magnetite veinlet, 1 1/4" at 35°, with quartz pyrite veinlet. 467' - 1/8-1/4" chalcopyrite-quartz-magnetite veinlet at 20° with 2" thick quartz-magnetite-chlorite-rich halo.
470	10	100%	21032	.07						Strong quartz-sericite alteration along veinlets; pervasive alteration is weak potassic; occasional fracture coated with clay, chlorite, pyrite, many veinlets have a minor amount of calcite.	472-473' Quartz-pyrite-chalcopyrite veinlets with pervasive silicification, magnetite. 1-2 quartz-magnetite-pyrite-clay veinlets per foot. Total sulfides all in veinlets with overall pyrite:chalcopyrite ratio equal to 1:1-2.
480	10	100%	21033	.09							488' - 1/8" magnetite-chalcopyrite veinlet.
490	10	100%	21034	.09							490' - 1/8"magnetite-chalcopyrite veinlet.

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
490						Quartz-Monzonite	Coarse-grained pinkish-grey, with fresh plagioclase faces, large K-spar phenocrysts; granitic texture.	Quartz-sericite halos around veinlets; sericite appears more abundant along quartz-pyrite veinlets than along quartz or magnetite-chalcopyrite veinlets. Silicified vein zone at 494-495' rimmed by magnetite-secondary K-spar veinlet. 498-499' - Quartz-K-spar and magnetite veinlets.	493' - 3" thick, granulated zone with chalcopyrite, magnetite veinlets within; dipping at 15°. 493.5' - As above with molybdenite. 494-495' Pervasive silicification; chalcopyrite, pyrite, molybdenite along quartz-magnetite veinlets. Also at 496' - 30°. 498-499' - Both veinlets carry pyrite,
500	10	100%	21035	.13					chalcopyrite, dipping at 15°. 501' - Quartz-pyrite-carbonate veinlet with minor epidote, chalcopyrite. 505' - Quartz-sericite-chalcopyrite,
510	10	100%	21036	.05			509-513' - Near-vertical fracture.	Carbonate material.	veinlet overall average sulfides in pyrite:chalcopyrite ratio of 1:1-2. One veinlet per foot to 580'. 519' - 1/4" quartz-pyrite- chalcopyrite
520	10	100%	21037	.09				Local vertical, chlorite-filled fractures. Increasing silica-magnetite chlorite veinlets to 524'.	veinlet at 35° rimmed with molybdenite. 520' Near-vertical quartz-magnetite-chalcopyrite-molybdenite veinlet; minor sericite. 522' - 1/4" chalcopyrite-quartz-magnetite veinlet.
524						Late Quartz-Monzonite Dike (Tertiary)	Medium-grained, olive green; contacts gradational, no observable dip.	Green color due to intense, pervasive alteration of rock to chlorite-clay-minor sericite assemblage;	Very minor pyrite, chalcopyrite along thin fracture planes.
530	10	100%	21038	.08				minor disseminated, partially oxidized magnetite (original).	
534						Quartz-Monzonite			

District Riverside-Kelvin

Hole Number K-1

Page Number 11

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
534						Quartz-Monzonite	As above, with local mottled appearance due to alteration of plagioclase.	Weak potassic.	534-535.5' - Quartz-sericite-magnetite vein zone, granulated; with abundant chalcopyrite; pyrite:chalcopyrite ratio of 1:2-3.
540	10	100%	21039	.15				542-543' Increased fracturing with abundant chlorite on fractures. 543' - 20-25% secondary biotite appears somewhat schistose. 546.5' Local secondary K-spar on quartz-chalcopyrite veinlet.	Quartz-magnetite and chlorite veinlets average 1-2 per foot with increased pyrite:chalcopyrite ratio of 1:1. No disseminated sulfides.
550	10	100%	21040	.05				Sericite shows masked decrease from above.	551, 552' - Quartz-magnetite-chalcopyrite veinlets. 554.5' - Quartz-K-spar-carbonate veinlet with pyrite, chalcopyrite. Below 555' - Quartz and total sulfide drop sharply to much less than 1%.
560	10	100%	21041	.06				566' - Sharp change to complete clay-alunite alteration of plagioclase, carbonate material on fractures is abundant.	564'-566' Silicified zone with abundant magnetite, chalcopyrite, local molybdenite. No quartz-chalcopyrite veinlets below 566', little to no sulfide material.
570	10	100%	21042	.09			Below 570' - Plagioclase feldspar becomes fresh, rock is coarse-grained but with no large K-spar phenocrysts.	570' - Rock appears somewhat silicified; pervasive, increased silica content.	
580	10	100%	21043	.02			581' - Schist fragment in quartz-monzonite.		586' - Quartz-K-spar-pyrite-chalcopyrite veinlet at 60°, 1/8" thick. 587-589' - Near vertical quartz-pyrite veinlet, 1/8".
590	10	100%	21044	.01					

District Riversidе-Kelvin Hole Number K-1 Page Number 12

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Mo	Rock Type	Rock Description	Alteration	Mineralization
590						Quartz-Monzonite	Light greyish-pink, coarse-grained with minor pink K-spar phenocrysts.	Weak to strong potassic with strong, biotite-magnetite alteration: 597' - K-spar-magnetite veinlet; no sulfide, little to no sericite, no carbonates.	Occasional thin, near-vertical quartz-magnetite-chalcopyrite-pyrite veinlets. Sulfides - none disseminated; veined sulfides very minor.
600	10	100%	21045	.02				600' - Quartz-magnetite veinlet with epidote; epidote associated with quartz-magnetitic veinlets at 601, 603'. Occasional shallow dipping chlorite-magnetite veinlets; minor epidote persists.	605' - 1/8" quartz-magnetite-chalcopyrite veinlet at 15°; pyrite in sericitic halo. 608' - 1/4" quartz-pyrite-chalcopyrite-sericite veinlet at 15°, with magnetite.
610	10	100%	21046	.04					615' - 1/4" quartz-magnetite-chalcopyrite veinlet. Below 615' minor chalcopyrite, pyrite on chlorite-magnetite fractures.
620	10	100%	21047	.05					618, 620, 622' - One quartz-magnetite-epidote veinlet per every two feet. 621' - Magnetite-chalcopyrite veinlet at 15°. 626' - Chaclopyrite-molybdenite on quartz-magnetite veinlet, 1/8" at 40°.
630	10	100%	21048	.03				634-650' - Slight clay-alunite alteration of plagioclase; occasional K-spar veinlet with no sulfides, magnetite; below 640' increasing abundance of carbonate material on fractures.	
640	10	100%	21049	.03					
650	10	100%	21050	.05					To 650' - Occasional thin quartz-magnetite-chalcopyrite veinlet with minor pyrite, sericite; total sulfides are very low with no disseminated pyrite or chalcopyrite. 657-659' - Near-vertical quartz-magnetite-chalcopyrite-pyrite veinlet.
660	10	100%	21051	.03					

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
660						Quartz-Monzonite	Coarse-grained, large pink K-spar phenocrysts; locally dark grey from abundant chlorite, magnetite, biotite.	Weak to strong potassic.	663' - 3" quartz-magnetite-pyrite veinlet at 30°, with minor chalcopyrite. Sulfide content very low, restricted to quartz and chlorite veinlets.
670	10	100%	21052	.02				677-680' - Quartz-magnetite-chlorite veinlets with local sericite; pervasive alteration is weak potassic with no K-spar veinlets.	672-673' 1/8-1/4" quartz-sericite-chalcopyrite at 5°.
680	10	100%	21053	.07				685-687' - Quartz-magnetite-sericite halo along veinlet occupies most of core.	685-687' - 1/8-1/4" quartz-magnetite-chalcopyrite veinlet; near-vertical. 689' - 1/4" quartz-chlorite-magnetite veinlet at 70° with minor chalcopyrite, pyrite.
690	10	100%	21054	.12				691-693' - Minor epidote with chlorite-magnetite in veinlets. 695' - Magnetite veinlet, 1/8" at 20°.	Overall pyrite-chalcopyrite ratio has decreased to ratio of 1:1-2; no disseminated sulfides. 695-701' - Several near-vertical quartz-magnetite veinlets with minor pyrite, chalcopyrite with chalcopyrite predominant.
700	10	100%	21055	.01			Local loss in granitic texture and change to dark grey color where quartz-magnetite is pervasive.	700' - 1/8" quartz-chlorite-carbonate veinlet at 30°. All feldspars fresh, minor secondary biotite, abundant chlorite, magnetite; added silica, magnetite in and along veinlets.	
710	10	100%	21056	.02			705-714' - Dark grey slightly sheared rock.	Pervasive magnetite-chlorite; moderate carbonate content. Below 717' - Strong chlorite-magnetite-clay alteration.	No quartz veinlets, little to no chalcopyrite. 718.5' - 1/16-1/8" quartz-magnetite veinlet at 30°with carbonate, minor pyrite, chalcopyrite.
720	10	100%	21057	.03					720' - Near-vertical chalcopyrite-chlorite-magnetite veinlets.

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
720						Quartz-Monzonite to Granite	Decreased amount of plagioclase in interval 500-700'. Very little at 720'.	Weak potassic; locally strong, chlorite filled fractures at 80°; some pervasive silicification along veinlets with disseminated pyrite:chalcopyrite.	722' - 1/8-1/4" quartz-K-spar-carbonate veinlet at 40° and 1/8-1/4" magnetite-chalcopyrite veinlet at 25-30°. Silicification accompanied by disseminated pyrite, chalcopyrite in pyrite:chalcopyrite ratio of 1:1.
730	10	100%	21058	.08			732' - Dark grey color due to abundant chlorite-magnetite-clay.	730-732' Vertical, chlorite filled fracture.	
735						Aplite Dike	Very fine-grained, aplite with weak potassic alteration.		Chalcopyrite-chlorite veinlet at 735', 1/8", some disseminated pyrite, chalcopyrite in 1:1 ratio.
740	10	100%	21059	.04		Quartz-Monzonite	Fault zone(?) intense shearing, brecciation; 741-745' - Grey-green. Continues to 758'.	Abundant chlorite, clay, sericite. K-spar clouded, plagioclase, all others altered to sericite, clay, minor chlorite; magnetite altered to magnetite-hematite, or removed.	740' - Minor molybdenum on quartz-magnetite-carbonate veinlet, 1/8". Apparent disseminated pyrite, chalcopyrite in 1:1 ratio due to brecciation. 746 & 747' Molybdenite on pyrite shears.
750	10	100%	21060	.06					752 & 753' - 1/8" quartz-chlorite-chalcopyrite veinlets at 40°.
758						Late Quartz-Monzonite (Tertiary)	Grey-green with sericite, medium-grained, pervasively altered.	Intense quartz-sericite with quartz-magnetite veinlets.	758' - 1/4" quartz-sericite veinlets at 30° with pyrite:chalcopyrite of 1:1, sulfides abundant.
760	10	100%	21061	.05		Quartz-Monzonite	Grey-green from pervasive sercite, but with mottled pink of K-spar.	Intense sericite-chlorite-clay with fresh K-spar; 1/2" quartz-magnetite veinlet at 760, 762'; carbonate material minor but pervasive; occasional steeply dipping chlorite veinlet.	762' - Quartz-magnetite veinlet with strong sericite halo with abundant pyrite:chalcopyrite in 1:1 ratio.
770	10	100%	21062	.10					

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
770						Quartz-Monzonite		Quartz-sericite to potassic, as above.	770' - 1/8" quartz-chalcopyrite veinlet at 20°; abundant chalcopyrite, no pyrite. 776' - 1/8" quartz-clay-pyrite veinlet at 30°. 777' - 1/8" near-vertical magnetite veinlet with minor chalcopyrite.
780	10	100%	21063	.05		Fault Breccia	Increased brecciation below 780'. 785' - Brecciated, sheared; intense alteration; locally appears granulated with rounded quartz grains.	Abundant chlorite, clay, sericite with locally all feldspars, all minerals altered; no veinlets.	781' - 2" quartz veinlet at 30°; minor chalcopyrite, magnetite. Below 780' minor disseminated pyrite: chalcopyrite in 1:1-2 ratio.
790	10	100%	21064	.05					
800	10	95%	21065	.02					
810	10	100%	21066	.22					
820	10	90%	21067	.06					Pyrite:chalcopyrite ratio increases to 5-10:1 below 820'.
830	10	90%	21068	.08					
838						End of Obvious Breccia, Late Quartz-Monzonite (?) (Tertiary)	Breccia below 838' is healed with quartz-magnetite-chlorite-sericite; heavy green clay-chlorite on shear planes.	Strong sericite, clay with abundant pyrite, magnetite, fresh K-spar in fragments	Below 838' sulfides disseminated and, veined; pyrite:chalcopyrite ratio 5:1.
840	10	100%	21069	.02			Below 838' brecciation continues; grey-green color due to strong sericite-chlorite.	Rock pervasively healed with quartz and magnetite disseminated magnetite 5-10%; some fresh K-spar.	840.5' - 1/4" magnetite-chalcopyrite veinlet.
850	10	100%	21070	.24					Sulfide content and pyrite:chalcopyrite ratio remain high.
860	10	100%	21071	.15					
868						Quartz-Monzonite to Granite	Coarse-grained pinkish grey with numerous large k-spar phenocrysts; no brecciation.	Locally strong silicification with magnetite; locally strong sericite; locally fresh, secondary biotite.	No disseminated sulfides. Very minor pyrite, chalcopyrite in 1:1 ratio with quartz.
870	10	100%	21072	.04					
880	10	100%	21073	.07					878' - 1/4" quartz-magnetite-chalcopyrite veinlet at 30°.
886						Pebble Breccia(?)	Intensely altered with apparent rounded fragments.	Intense quartz-sericite, pervasive alteration.	Local magnetite veinlets, disseminated sulfides.
890	10	100%	21074	.06					

District Riverside-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
890						Pebble Breccia (?)	As above.	Abundant quartz-carbonate veinlets; magnetite.	Disseminated pyrite and chalcopyrite in 5-10:1 ratio, veined pyrite and chalcopyrite in 1:1 ratio; sulfides predominantly disseminated, minor bornite associated with chalcopyrite(disseminated) minor disseminated and veined chalcopyrite; overall pyrite: chalcopyrite ratio 1-2:1.
900	10	100%	21075	.22		Diabase Dike	Black, fractured, very fine-grained-aphanitic.	Strong clay-sericite with quartz-magnetite carbonate veinlets.	
904						Quartz-Monzonite to Granite	Coarse-grained, with pink k-spars. 905' - Strong shattering; dark green, sheared appearance.	Weak to strong potassic with quartz-sericite-magnetite veinlets. 905-909' - Strong chlorite on fractures; clay-sericite.	Minor disseminated pyrite, chalcopyrite in 1:1 ratio. 907' - 1/4" quartz-chalcopyrite veinlet at 20°; 1/8" quartz-pyrite-chalcopyrite veinlet at 35°. To 910' - Broken chalcopyrite veinlets; pyrite:chalcopyrite ratio of 1:2-3.
910	10	100%	21076	.18			Coarse-grained, grey granite with large pink k-spar phenocrysts. 914'- Little to no fracturing.	Weak potassic with locally pervasive quartz-chlorite-magnetite; 912' - 1/8" magnetite veinlet at 20°. Weak potassic with very fresh, secondary biotite; quartz-sericite-magnetite alteration; in veinlets and pervasive.	Narrowly-spaced hairline fractures carrying clay and chalcopyrite; chalcopyrite associated with pervasive silica as disseminations; total sulfide less than 1%; pyrite:chalcopyrite ratio of 1:2-3. 913' - Abundant chalcopyrite on 1/8" quartz-sericite veinlet at 80°. Below 914" - Quartz-sericite-pyrite veinlets carry chalcopyrite; ratio pyrite:chalcopyrite increase to 1-2:1. 918 & 919' - 1/2-3/4" quartz-chalcopyrite veinlet at 40° with 4" halo of sericite with molybdenite.
920	10	100%	21077	.05				Occasional hairline veinlet of chlorite-biotite with pyrite, minor chalcopyrite.	921' - 1/8" magnetite-chalcopyrite veinlet at 20°.
923								Weak potassic with continued pervasive quartz-magnetite-biotite.	923' - 1/4" magnetite veinlet at 10° with minor chalcopyrite, pyrite; cut by 1/8" carbonate veinlet; also 1/8" quartz-pyrite-chalcopyrite veinlet, vertical.
926									

District Riversiide-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
926						Quartz-Monzonite to Granite			926-927.5' - 1/8" magnetite veinlet at 3-5° with minor chalcopyrite. Pyrite and chalcopyrite in 1:1 ratio associated with quartz-magnetite alteration; total sulfide less than 1%.
							928.5'- Complete loss of rock texture to dark grey, brecciated appearance.	928.5' - Abundant quartz-magnetite introduced at 20-25°.	928.5'-932' - Moderately abundant chalcopyrite in quartz-magnetite.
930	10	100%	21078	.03				930' - Secondary k-spar-chlorite veinlets.	930' - k-spar veinlets with magnetite, minor chalcopyrite, little to no pyrite.
								932'- Rock as at 928.5-930' with 80% quartz-magnetite-sericite.	932.5' - 1/8" quartz-chalcopyrite veinlet at 35° and at 30°.
935	5	100%	21099	.09				935' - 1/16" k-spar veinlet with chalcopyrite.	936' - 1/8-1/4" magnetite-quartz-chalcopyrite veinlet at 5°; pyrite:chalcopyrite ratio of 1:1; pyrite and chalcopyrite disseminated with quartz-sericite alteration in 1:1 ratio. 937' - 1/2" quartz-magnetite-chalcopyrite veinlet at 35°, bearing minor molybdenite. 939.5' - 1/4" quartz-chalcopyrite veinlet at 35°. Local molybdenite in sericite halos along quartz veinlets.
940	5	100%	21080	.10				940' - 80-100% quartz-magnetite-sericite-chlorite alteration.	940' - Disseminated and veined pyrite and chalcopyrite in 1:1-2 ratio; total sulfide 1-2%. 942-942.5' - 1/4" near-vertical chalcopyrite veinlet; no pyrite (one foot interval with 3-5% copper). 1/8" chalcopyrite veinlet at 944'. Overall pyrite:chalcopyrite ratio decreased to 1:1-3. Very minor molybdenite.
945	5	100%	21081	.59					Very strong chalcopyrite with quartz-magnetite chlorite at 946.5' and 947-948', pyrite:chalcopyrite = 1:3-4.
950	5	100%	21082	.74					949-951' - Brecciated zone with massive pyrite:chalcopyrite in 1:1 ratio.

District Kelvin-Riverside

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
952						Quartz Monzonite to Granite (?)	Rock is extremely broken, shattered, with abundant chlorite, magnetite on all fracture planes, very little rock texture observed.	80-100% replacement by quartz-magnetite-chlorite and sericite; distinct lineation of fracturing and chlorite and magnetite veinlets at 5-10° to core axis.	Pyrite and chalcopyrite occur on most fractures and with magnetite and quartz, veinlets appear partially broken, partially untouched. 2-3% total sulfides with 1:1-2 pyrite: chalcopyrite ratio.
955	5	100%	21083	.71					
960	5	100%	21084	.38					958' and 961' Strong chalcopyrite associated with massive sericite and magnetite-chlorite, respectively; continues from 961-962'.
963.5									962-963.5' Massive magnetite-chlorite with little to no sulfide.
965	5	80%	21085	.35		Diabase Dike (Precambrian)	Intensely broken, shattered. Brecciated to 967' with 50% core loss; rock is fine-grained-aphanitic dark grey blocks.	Intense quartz-sericite is pervasive with moderate chalcopyrite, quartz-magnetite veinlets; chlorite and carbonate coat all fractures.	Pyrite, chalcopyrite on fractures; chalcopyrite on veinlets with magnetite; overall pyrite:chalcopyrite ratio is 1:1, abundant chalcopyrite with chlorite-magnetite veinlets at 969 and 971'.
970	5	95%	21086	.31				970' Quartz-K-Spar veinlet cut by carbonate veinlets.	974'-976' Carbonate-chalcopyrite-pyrite veinlets; very abundant chalcopyrite at 975-976', with carbonate and magnetite-chlorite veinlets.
975	5	100%	21087	.16			Increased fracturing and shearing below 975'.		Fracturing with abundant chalcopyrite to 979'; pyrite:chalcopyrite ratio of 1:1-2.
980	5	100%	21088	.55					
985	5	100%	21089	.11					
989									
990	5	100%	21090	.10		Quartz Monzonite to Granite	Dark grey, sheared, partially broken quartz-monzonite.	Moderately strong quartz-sericite locally with abundant magnetite, chlorite. 991' - 1/8" near vertical K-spar veinlet; locally abundant chlorite-magnetite-hematite on fractures, shear planes.	Below 991' - chalcopyrite very abundant with pyrite:chalcopyrite ratio of 1:2-3; chalcopyrite associated with quartz-magnetite veinlets and magnetite clusters on shears.
995	5	100%	21091	.54					

District Kelvin-Riverside

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
995						Quartz Monzonite to Granite		Pervasive quartz-sericite with abundant magnetite, chlorite.	Abundant chalcopyrite-quartz-magnetite veinlets with associated molybdenum; pyrite-chalcopyrite ratio is 1:2-3; some disseminated chalcopyrite in quartz -sericite alteration.
1000	5	100%	21092	1.62				1002' Quartz-specularite veinlet.	1002' 1" quartz-specularite veinlet with abundant chalcopyrite, molybdenite at 45°.
							Below 1003' Fractured, partial brecciation or fluidization.	Late stage carbonate material filling vugs, fractures. Pervasive sericitization of feldspars to 1008';	1003' Intersection of two quartz-magnetite-chalcopyrite veinlets at 50° and 5°, 1/8-1/4" thick. Minor disseminated pyrite and chalcopyrite in 1:2-3 ratio throughout; molybdenum associated with chalcopyrite on quartz veinlets.
1005	5	100%	21093	.49					1005' 1/4" quartz-magnetite-chalcopyrite veinlet.
							Below 1008' Considerably less brecciation.	Below 1008' locally fresh pink k-spar phenocrysts within predominant sericite alteration; sharp drop in number of quartz veinlets and chalcopyrite.	1007 and 1009" 1/8-1/4" magnetite-,chlorite veinlets at 80° with minor chalcopyrite.
1010	5	100%	21094	.13					
1011.5						Diorite Dike	Fine-grained dark grey with numerous grey-green sericite clusters; very intensely shattered.	Pervasive, very strong sericite; abundant very fine-grained, disseminated magnetite; occasional quartz-chalcopyrite veinlet.	Very minor chalcopyrite along shears.
1015	5	100%	21095	.09					
1019						Quartz Monzonite to Granite	Coarse-grained; dark grey.	Pervasive sericite after all minerals except quartz to 1023'; very minor chlorite; local magnetite.	1017' 2" Quartz-molybdenite veinlet. 1019' 6" quartz veinlet with 1/8-1/4" selvages of sericite-molybdenite. Minor disseminated chalcopyrite, increasing to 1023' in pyrite:chalcopyrite ratio of 1:2; major molybdenum on quartz veinlets.
1023									

District Riversíde-Kelvin

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1023						Quartz Monzonite to Granite	1023' Pink color returns.	1023' Sharp change to fresh, pink K-spar phenocrysts with major amounts of chlorite, magnetite; abundant magnetite-hematite and chlorite on fractures; plagioclase and part of K-spar locally sericitized.	Very minor disseminated pyrite:chalcopyrite in pyrite:chalcopyrite ratio of 1:1; pyrite-chalcopyrite ratio is the same in very spotty quartz-chalcopyrite K-spar veinlets. Occasional 1/4" quartz-chalcopyrite veinlet at 30° with little to no pyrite; molybdenite has dropped off sharply in content.
1025	5	100%	21097	.22					
1030	5	100%	21098	.60		Quartz Monzonite to Granite.	1030-1034' Major fracturing, breaking.	1030' K-spar in quartz veinlet. 1033.5' Minor anhydrite (clear white, pearly, H.4) in quartz-magnetite-chalcopyrite veinlet; 1031.5-1033.5' - 1/8" veinlet of secondary K-spar; strong diorite-sericite to 1034'; strong chlorite-sericite to 1034'; 1034-1039' - fresh K-spar with abundant magnetite, chlorite. 1039' - 5" quartz vein with no mineralization.	1032' - 1/8" quartz-magnetite-chalcopyrite, pyrite veinlet at 0-5°; pyrite: chalcopyrite ratio is 1:1.
1040	10	100%	21099	.03				Weak potassic with locally strong sericitic alteration; carbonate material is minor but widespread; magnetite predominantly introduced; less than at 1030-1040'. 1048' Magnetite-quartz veinlet at 40°; no chalcopyrite.	1041' - 1/4" quartz-pyrite-chalcopyrite veinlet at 30° cutting quartz-magnetite veinlet with 2" sericite halo. 1045.5' 1" quartz-magnetite-chalcopyrite veinlet at 80° with selvage of secondary K-spar. Little to no disseminated pyrite or chalcopyrite; pyrite: chalcopyrite ratio in veinlets is 1:1. 1049' - two veinlets at 40°, quartz-sericite-pyrite-chalcopyrite.
1050	10	100%	21100	.03			Brecciation, shearing increases sharply below 1050'.	Abundant sericite; chlorite on fractures; 1053-1054' abundant magnetite veinlets.	Locally minor amounts of molybdenite adjacent to quartz veins.
1055									

District Riverside-Kelvin

Hole Number K-1

Page Number 21

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1055						Quartz-Monzonite to Granite			1055' - 1" quartz-carbonate veinlet with moderate amount of molybdenum in sericitic halo. 1057' - 1/8" chalcopyrite-pyrite veinlet at 45°.
1060	10	100%	21501	.03				Weak potassic with moderate sericite; quartz veinlets, minor. 1062' Massive chlorite-magnetite. 1067' - 1/2" quartz-magnetite veinlet; magnetite dissemination is minor.	
1070	10	100%	21502	02				Sericite halos along quartz magnetite veinlets. 1076-1077' - 1/4" magnetite veinlet at 20°.	1070' Quartz-sericite veinlet - pervasive into granite with pyrite, chalcopyrite in 1:1 ratio. Sulfides minor. 1072-1073' Quartz-sericite alteration with minor disseminated pyrite, chalcopyrite. 1076' - 1/4" quartz-magnetite-chalcopyrite veinlet at 40°. 1076-1077' Associated sericite, chalcopyrite, (minor).
1080	10	100%	21503	.04			Continued coarse-grained texture, little to no fracturing or shearing.	1084-1086' Quartz-magnetite-K-spar veinlets with minor chalcopyrite; minor epidote blebs.	1079-1081' Sericitization with chalcopyrite along magnetite veinlets at 35°.
1090	10	100%	21504	.05				1092' - 1/8" epidote veinlet at 50°. 1096' - 1/8" near-vertical magnetite veinlet with sericite halo.	1086-1092' Local sericite veinlets, hairline to 1/16", with pyrite, chalcopyrite in ratio of 1-2:1. 1094' Quartz-magnetite-calcite. 1096' - 1/2" Quartz-sericite-magnetite veinlet at 30°, minor chalcopyrite.
1100	10	100%	21505	.03				1100' Secondary K-spar-epidote veinlet. 1104' Quartz-sericite-magnetite veinlet.	1100' - 6" pervasive quartz-sericite-magnetite alteration with disseminated chalcopyrite and pyrite in pyrite: chalcopyrite ratio of 1:1-2. Total sulfides less than 1%; no disseminated pyrite or chalcopyrite.
1110	10	100%	21506	.03					

District Kelvin-Riverside

Hole Number K-1

Page Number 22

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1110						Quartz Monzonite to Granite		1111' - 1/2" quartz-magnetite veinlet at 95° with sericite halo.	
1113							Rock is very fresh with some fresh plagioclase faces; continued dominance of coarse-grained granitic texture with large, pink, K-spar phenocrysts.	1113' - 1/2" quartz-chalcopyrite-specularite veinlet 95°. Weak potassic. 6" coarsely crystalline K-spar, quartz-muscovite; below 6" pegmatite-major chlorite-magnetite.	1113' Grain boundary relationship of chalcopyrite and specularite (sericite halo); copper in sericite halo disseminated. Approximately one quartz veinlet per foot carrying minor pyrite, chalcopyrite in 1:1 ratio, mostly in sericite halos; Total sulfide much more than 1%.
1120	10	100%	21507	.06					
1122						Diabase	Very fine-grained; intensely fractured.	Quartz-sericite-weak potassic; local quartz-chalcopyrite and quartz-magnetite veinlets; abundant calcite on all fractures; strong chlorite.	1126' - 1/4" quartz-magnetite veinlet at 20° with minor chalcopyrite; no disseminated pyrite or chalcopyrite. 1129' - 1/4-1/2" quartz-magnetite veinlet at 25° with abundant chalcopyrite, minor pyrite.
1130	10	100%	21508	.05			1136-1139' Intensely shattered.	1134.5' 1/4" vertical quartz-magnetite veinlet cut by 1/2" quartz-magnetite veinlet at 30°.	1131' - 16" calcite-chalcopyrite-pyrite veinlet at 30°. 1132-1133' - 1/2" quartz-magnetite veinlet at 15° with sericite halo contains minor fine-grained chalcopyrite.
1139									
1140	10	100%	21509	.06		Quartz Monzonite to Granite	As above.	Weak potassic with quartz-magnetite veinlets with sericite halos.	1141' - 1/4" magnetite veinlet with 6" wide sericite halo with disseminated chalcopyrite. 1144-1145' Quartz-sericite veinlet with halo of sericite, disseminated chalcopyrite, moderate molybdenite. 1145.5' 1/8" quartz-magnetite-chalcopyrite-pyrite veinlet at 25° with 1" sericite halo.
1147									

District Kelvin-Riverside　　Hole Number K-1　　Page Number 23

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1147						Quartz Monzonite	Coarse-grained texture abundant large K-spar phenocrysts; no fracturing.	Weak potassic with very fresh K-spar and some fresh plagioclase; moderate chlorite-magnetite after mafics; quartz-pyrite and quartz-magnetite veinlets with sericite halos.	Pyrite:chalcopyrite ratio is 1:1 in quartz-pyrite veinlets. No disseminated sulfides.
1150	10	100%	21510	.07				1158' Quartz-K-spar-chalcopyrite veinlet.	1156' - 1/4" quartz-magnetite veinlet at 30° with chalcopyrite in veinlet and disseminated in sericite halo. 1158' Chalcopyrite in 1/4" quartz-K-spar veinlet at 30°.
1160	10	100%	21511	.04				1160' Secondary biotite in quartz veinlet. Carbonate remains weak but pervasive as fracture, vug fillings.	1160' Quartz-pyrite-sericite-chalcopyrite veinlet at 5°. 1164' - 1/8" quartz-chalcopyrite veinlet at 5°; abundant chalcopyrite, little to no pyrite. 1164.5' Quartz-magnetite-actinolite veinlet at 80° with abundant chalcopyrite, no pyrite; strong sericitization.
1170	10	100%	21512	.06			1176' - 8" aplite dike.	1169-1170' Minor secondary K-spar. 1178-1180" Numerous magnetite. Below 1170' - considerably less sericite in halos along quartz veinlets.	1169-1170' - 2 1/4" quartz-magnetite pyrite-chalcopyrite veinlets at 45° with pyrite:chalcopyrite in 1:1-2 ratio. 1177' Near vertical, 1/8" pyrite-chalcopyrite veinlet.
1180	10	100%	21513	.04				1180-1184' Numerous quartz-magnetite and K-spar veinlets with little to no chalcopyrite.	1180'-below: pyrite:chalcopyrite ratio in veinlets increases to 1-2:1; no disseminated sulfides; total sulfides much less than 1%. 1185' - 7' moderately abundant chalcopyrite in quartz-pyrite-chalcopyrite veinlets. 1187' - 3/4" quartz veinlet at 45° with moderately abundant chalcopyrite, no pyrite. 2" halo of sericite with disseminated chalcopyrite, magnetite.
1190	10	100%	21514	.04					

District Kelvin-Riverside

Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1190						Quartz Monzonite to Granite	As above, interspersed with light grey material.	Weak potassic with near-vertical K-spar veinlets at 1189-1190'. Strong potassic alteration 1198-1200' Epidote on fractures with magnetite.	1191.5' Pyrite; chalcopyrite on 1/16" chlorite fractures at 30°. 1194'-1198' Numerous magnetite veins and veinlets at 20-30° with locally abundant chalcopyrite with pyrite: chalcopyrite ratio of 1:1.
1200	10	100%	21515	.02				1200' Secondary biotite is very fresh; secondary K-spar veinlets. 1206' - 1" quartz-K-spar veinlet at 70°; minor carbonate (late) still pervasive.	1202' 1/2" quartz-K-spar veinlet at 45° with 2" sericite halo containing minor chalcopyrite. 1208' 1/4" chalcopyrite veinlet with associated quartz-magnetite; no pyrite.
1210	10	100%	21516	.04				1207-1210' Abundant K-spar-quartz-magnetite veinlets; magnetite-sericite replacement of wall rock.	Total sulfides much less than 1%, no disseminated pyrite or chalcopyrite. 1216' Abundant chalcopyrite on 1/4" quartz-K-spar veinlet at 15°; also at 1218'.
1220	10	100%	21517	.02			Normal porphyritic rock above interspersed with light grey quartz-monzonite with no large pink K-spar phenocrysts; rock appears to be completely healed breccia with relict fragments of granite porphyry in matrix with broken feldspars.	1229' - 1/8-1/4" K-spar epidote veinlet at 70°.	1222-1224' - 1/8" near-vertical magnetite-chalcopyrite-pyrite veinlet with pyrite:chalcopyrite ratio of 1:12. 1228' - 1/8" quartz-magnetite-pyrite-chalcopyrite veinlet at 45°; pyrite: chalcopyrite ratio of 1:1. 1229.5' - 1/4" quartz-magnetite veinlet at 45° with 1" sericite halo contains minor chalcopyrite.
1230	10	100%	21518	.05					

District Kelvin-Riverside Hole Number K-1 Page Number 25

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo			Rock Type	Rock Description	Alteration	Mineralization
1230								Quartz Monzonite			
1231								to Granite	As above.	Weak to strong potassic.	Minor pyrite, chalcopyrite in 7/8" veinlets, total sulfides less than 1%; no disseminated pyrite or chalcopyrite.
1235								Aplite	Fine-grained aplite with minor sericite blebs.	Weak potassic with local quartz veinlets with sericite halos.	1235' - 1/4" barren quartz veinlet with 1-2" sericite halo containing moderately abundant disseminated chalcopyrite, pyrite in pyrite:chalcopyrite ratio of 1:2-3; similar 1/4" veinlet at 1235.5'.
											1239' Near vertical 1/4" quartz veinlet with blebs chalcopyrite.
1240	10	100%	21519	.03							1246' - 1/4"quartz-chalcopyrite veinlet at 35°.
											1249' - 1/4" quartz-sericite-magnetite veinlet at 40° with abundant chalcopyrite.
1250	10	100%	21520	.02						1252' - 1/16" pyrite-sericite veinlet at 30°.	1253.5' - 1/4" quartz veinlet with 3" halo of sericite with more abundant disseminated chalcopyrite.
											1255' - Chalcopyrite-sericite veinlet, 1/16" at 45°.
											1259.5' 1/4" quartz-carbonate veinlet with 3" halo containing abundant molybdenum.
1260	10	100%	21521	.02							
1263								Quartz Monzonite to Granite	Fractured, sheared.	Abundant chlorite, clay, sericite decreasing with decreasing fracturing away from aplite contact.	1268' 1/4-1/2" pyrite-chalcopyrite-magnetite-quartz veinlet at 10° with molybdenum; pyrite:chalcopyrite ratio 2-3:1 with massive sulfide content.
1270	10	100%	21522	.06							1271-1273' Near-vertical quartz-magnetite chalcopyrite veinlet;
										1275'-below: Apparent injection of aplite into granite; locally strong quartz-sericite cut by fine-grained fresh K-spar.	1273' Local thin pyrite-chalcopyrite veinlets with pyrite:chalcopyrite ratio 1-2:1.
1276									as above.	Weak potassic with quartz veinlets with sericite halos.	1279' - 1/4" quartz-sericite veinlet, chalcopyrite in sericite halo, disseminated.
1280	10	100%	21523	.06							

District Kelvin-Riverside Hole Number K-1 Page Number 26

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1280						Quartz Monzonite to Granite		1283' Locally fresh secondary biotite. 1287-1289 and 1293-1296' Strong sericite-magnetite-quartz replacement and veinlets.	1285' - 1/2-1" quartz veinlet with thin (1/4") sericite halo containing molybdenum. 1287-1289' Veinlets and pervasive replacement by quartz-magnetite with moderately abundant chalcopyrite, no pyrite; same at 1293-1296'; minor molybdenum in sericite of both intervals.
1290	10	100%	21524	.10					
1300	10	100%	21525	.14			Considerable breaking, shearing at 1297-1300'.	Abundant chlorite, magnetite, clay.	Occasional hairline quartz-sericite-magnetite veinlets to 1305', with minor chalcopyrite. 1306' 1-1 1/2" quartz-sericite-chalcopyrite-pyrite veinlet at 45°; pyrite:chalcopyrite ratio = 1:2-3.
1310	10	100%	21526	.03				Core is cut by numerous hairline fractures or veinlets carrying major chlorite, quartz or K-spar. Below 1315': little to no evidence of K-spar in veinlets although K-spar and plagioclase phenocrysts are fresh.	Most hairline veinlets contain minor sulfides in pyrite:chalcopyrite ratio of 1:1. 1313' Intersection of three 1/4" quartz-magnetite-chalcopyrite veinlets.
1320	10	100%	21527	.07					1320' 1/8" quartz-sericite-magnetite veinlet at 30° with 3-4" sericite halo with abundant chalcopyrite. 1328' 1/4" quartz-magnetite veinlet at 40°; also at 1330'.
1330	10	100%	21528	.04				Quartz veinlets very spotty, carry no pyrite or chalcopyrite.	Total sulfides appear to drop even lower to .1-.3% with pyrite:chalcopyrite ratio 2-1:1 on thin, hairline fractures.
1340	10	100%	21529	.03					

District Kelvin-Riverside Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1340						Quartz Monzonite to Granite		Weak potassic; locally fresh secondary biotite at 1341-1343'.	1343' 1/4" quartz-magnetite-sericite veinlet at 70° with minor chalcopyrite, molybdenum. Also at 1345'. 1348' 1/8" quartz-sericite-magnetite chalcopyrite veinlet at 40°; strong sericite halo with disseminated chalco-pyrite.
1350	10	100%	21530	.07				Below 1350': Continued weak potassic alteration with minor clay-sericite alteration of plagioclase. 1357' - 1" barren quartz veinlet.	1355' 6" quartz-sericite-magnetite alteration with minor chalcopyrite; no pyrite.
1360	10	100%	21531	.03			1366'-1369' - 3' aplite dike; contact at 30°.	No quartz-sericite-chalco-pyrite.	Veinlets as in aplite dike at 1235'. 1369-1372' Several near-vertical quartz sericite veinlets with moderately
1370	10	100%	21532	.03				Strong sericite-chlorite-magnetite alteration below aplite dike for 5'.	abundant chalcopyrite. 1376' 1/4" quartz-K-spar-chalcopyrite veinlet at 30°.
1380	10	100%	21533	.08			Fault Zone or shear at 1779-1781'.	Weak to strong potassic alteration. 1388' -1/8" epidote vein-let at 60°.	1383-1384' Quartz-magnetite-K-spar alteration with chalcopyrite. 1385' 1/8" pyrite-chalcopyrite veinlet at 35° with pyrite:chalcopyrite ratio of 1:2-3. Total sulfides .1-.3% with overall pyrite:chalcopyrite ratio 1:1. 1386-1387' - 1/10-1/8" quartz-K-spar veinlet with local magnetite, chalco-pyrite and pyrite. 1387' - 1/4" quartz-K-apar veinlet at 75° with 1" halo sericite-magnetite with minor chalcopyrite.
1390	10	100%	21534	.06					

District Kelvin-Riverside | Hole Number K-1 |

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1390						Quartz Monzonite to Granite	Continued breccia fragments of granite in rock; locally very coarse-grained, due to possible K-spar introduction.	Weak to strong potassic alteration; moderately abundant chlorite and magnetite. 1390.5' Secondary K-spar veinlet at 70°; some clay-sericite alteration of plagioclase. Original K-spar phenocrysts locally cut by quartz-magnetite stringers. Below 1392': apparent pervasive introduction of quartz-magnetite.	1391' - 1/4" quartz veinlet at 80° with 2" halo of sericite and magnetite containing disseminated chalcopyrite and molybdenum; also at 1391.5'. 1393' - 1/2" Quartz-epidote veinlet with selvage of K-spar (secondary) and minor chalcopyrite at 50°. 1394-1395' - Two 1/2" quartz-magnetite-sericite veinlets at 30° with minor chalcopyrite, pyrite in pyrite:chalcopyrite ratio of 1:2.
							Rock continues to appear as breccia, healed by pervasive potassic alteration.	1397' - 1" thick zone of K-spar-quartz-epidote replacement with magnetite.	1397' Minor chalcopyrite in K-spar zone.
1400	10	100%	21535	.04			1400-1400.5' Aplite. 1405' Contact of breccia and light grey quartz-monzonite at 35°	Quartz-sericite veins. Chlorite-magnetite predominant on fractures. Occasional K-spar-quartz veinlet; minor fresh, secondary biotite.	Veins contain moderately abundant disseminated chalcopyrite, no pyrite. Occasional chalcopyrite-quartz veinlet.
1410	10	100%	21536	.05				1418' - 1/4" K-spar quartz anhydrite veinlet. 1-2 veinlets per foot at 1420'.	1414' Near-vertical 1/8" chalcopyrite-magnetite-quartz veinlet. 1418' Minor chalcopyrite, molybdenum with K-spar-anhydrite veinlet.
1420	10	100%	21537	.03					

District Kelvin-Riverside Hole Number K-1

Depth	Int.	% Core Rcvy	Samp. No.	Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1420						Quartz Monzonite to Granite	As above. Rock cut by numerous hairline fractures, appears brecciated.	1420-1421' Vein plus pervasive introduction of K-spar-magnetite-quartz-minor sericite.	1420-1421' Very minor chalcopyrite with introduced potassic alteration. 1423-1428' Vertical quartz veinlet with minor pyrite, chalcopyrite, magnetite, 1/16". 1429'1" quartz-magnetite-sericite veinlet.
1430	10	100%	21538	.04			Brecciation continues.		1432' Pervasive quartz-sericite-magnetite with abundant sulfides with pyrite:chalcopyrite ratio of 1:1.
1440	10	100%	21539	.05			Below 1445': strong brecciation.	1446' Magnetite-chlorite veinlet, 1/4" at 50°. Brecciation with matrix of quartz-magnetite and minor sericite.	1444' - 1/4" quartz veinlet with massive molybdenum. 1448.5' - 1/16" quartz-magnetite-chalcopyrite veinlet at 30°. 1449' - 1/8" quartz-magnetite-chalcopyrite veinlet at 30°.
1450	10	100%	21540	.06			Continued brecciation with matrix of potassic alteration; local shearing, fracturing.	Secondary K-spar is becoming much more abundant. 1452' - 1/4" magnetite veinlet at 35°.	1450'-1451' 1/2" near-vertical quartz-magnetite-K-spar veinlet with local disseminated chalcopyrite. No disseminated sulfides; pyrite:chalcopyrite ratio of 1:2-3. 1458 and 1459' - 1/8" quartz-sericite-chalcopyrite veinlets at 40°. 1459-1459.5' Vertical magnetite-chlorite veinlet; cut at 1459.5' by 1/8-1/4" quartz-epidote-molybdenum veinlet at 35°.
1460	10	100%	21541	.06				Weak to strong.	1465-1467' Numerous quartz-K-spar-magnetite veinlets with minor chalcopyrite.
1467							Still has fractured, brecciated appearance which has been healed by potassic alteration.	Weak to strong potassic; very strong introduced magnetite; abundant chlorite disseminated and on steeply dipping fractures.	1469' - 1/4" chalcopyrite-magnetite-clay veinlet at 35°.
1470	10	100%	21542	.02					

District Kelvin-Riverside   Hole Number K-1   Page Number 30

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
1470						Quartz Monzonite to Granite		Magnetite veinlets are very abundant; cut the core at all angles.	Near-vertical quartz-magnetite-chalcopyrite veinlet at 1473'. 1475' Vertical chlorite-pyrite fracture. 1478.5' Massive K-spar cut by chalcopyrite veinlet at 80°.
1480	10	100%	21543	.04					1484' Near-vertical 1/8-1/4" quartz-magnetite-chalcopyrite veinlet. 1485' - 1/4" sericite-molybdenum veinlet at 80-90°. 1487' - 1/8" quartz-magnetite veinlet at 40°.
1490	10	100%	21544	.08				Continued brecciation, healed by pervasive and veined quartz-magnetite-sericite alteration.	Three to four quartz-magnetite-sericite veinlets to total depth with pyrite, chalcopyrite in pyrite:chalcopyrite ratio of 1:1-2; no disseminated sulfides; total sulfides remain very low. 1494' - 1/4" magnetite-chalcopyrite veinlet.
1500	10	100%	21545	.08					

------------ 1500 FEET IS TOTAL DEPTH ------------

KERR-McGEE CORPORATION

District: Riverside - Kelvin
Hole Number: K-4
Spudded: 5-9-73
Completed: 7-13-74
Total Depth: 875'
Driller: Joy Mfg.
Logged By: D.A.Wolfe

County: Pinal State: Arizona
Claim: State Section Sec 10 T. 4 S. R. 13 E.
Elevation: ~ 1960'
Hole Size:
Core Size: NC 0' to total depth.
Hole Angle: Vertical
Collar Coords.: 700 ft FSL N.
1000 ft FEL E.

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu %	Assays Mo ppm	Assays Pb ppm	Rock Type	Rock Description	Alteration	Mineralization
		STARTED CORING AT 21 FEET								
21							Breccia	Predominant rock type	Quartz-sericite-clay alter-	Very minor capping after possible chalco-
								appears to be late	ation with abundant magne-	pyrite and tenorite-neotocite. Minor pyrite
								quartz-monzonite. Por-	tite on veinlets, abundant	voids. Rock is 100% oxidized.
								phyry dike in extremely	clay-chlorite; 100% oxidized	
40	7		24007	.0706	22	230		brecciated granulated	calcite vein filling.	
								material with original		
								rocks and brecciated		
								character concealed by		
50	10		24008	.0462	15	18		pervasive hematite		
								stain.		
55							Late Quartz	Fine-grained aphanitic	All original mafics and	Minor black mineral, tenorite or neotocite
							Monzonite	groundmass with abun-	feldspars altered to clay	on all fractures and near quartz veinlets,
							Porphyry	dant feldspar, mafic	and sericite, minor magne-	no visible sulfides.
							Dike	and quartz phenocrysts,	tite; local quartz-chlorite	
70	10		24010	.0209	7	31		less brecciated below	veinlets.	
								55'.		
										75' Local capping after probable chalco-
80	10		24011	.0195	5	22			Below 81' K-spar pheno-	pyrite associated with abundant tenorite(?)
									crysts locally fresh.	
90	10		24012	.0144	8	11				
								92-109' Brecciated,	Local calcite vein fillings,	
100	10		24013	.0181	10	22		sheared, granulated.	extensive clay-chlorite-	
									sericite alteration.	
109	9		24014	.0516	9	26				Weak capping after probable chalcopyrite
										at 109'.

District Riverside, Kelvin Hole Number DDH K-4 Page Number 2

Depth	Int.	% Core Rcvy	Samp. No.	Assays Cu	Mo	Rock Type	Rock Description	Alteration	Mineralization
109	to					Late Quartz	Can't be certain of	The most intact rock shows	Original sulfide content probably
120	11	100	24916	.0492		Monzonite	rock identification	quartz, probably secondary	3-4%, now entirely oxidized.
						Porphyry or	where iron oxides stain	orthoclase, some chlorite,	
						Granite	all feldspars to a red-	some sericite. The shat-	
130	10	100	24917	.0224		Breccia(?)	dish-grey color. And	tered zones show sericite	
							some orthoclase may be	and kaolin as well. No	
140	10	100	24918	.0427			entirely secondary.	biotite. Hematite psuedo-	
						142-146' Breccia	Rounded, slickensided	morphic after pyrite is	
						Fault	fragments.	abundant as well as stain	
								on fracture surfaces and	
150	10	100	24919	.0860				among interstices.	
						154-155'	Dark brown to black,		154' Soft blue copper compound in
						Lamprophere	aphanitic, crossed by		fracture, brochantite(?)
						Dike	fractures filled with		
							calcite, kaolin. Matrix		
							seems to be mostly ser-		
							pentine.		
						155'	As above, almost all		
						Precambrian	shattered.		156-158' More copper stains, malachite,
160	10	100	24920	.2700		Quartz			azurite on fractures.
						Monzonite	168-173' Rock is some-	168' Biotite abundant	Locally abundant molybdenum-rich
							what darker than above,		copper-bearing(?) stains on fractures.
							with biotite and goe-		
170	10	100	24921	.2200			thite stain.		
175	5	100	24922	.0870					177-179' Copper stains, malachite,
180	5	100	24923	.2900					azurite.
183						Shear Zone(?)	Rock is extensively	Pervasive sericite-clay	Abundant brick-red to maroon limonite
							brecciated, sheared,	alteration with local,	after pyrite-chalcopyrite mixture
							with little to no orig-	strong quartz veining at	with chalcopyrite capping weak but
							inal rock texture,	30-40°, rock is 100% oxi-	pervasive.
							bleached white, typical	dized and bleached white.	
190	10		24924	.0733			of chalcocite capping		
							with red hematite after		
200	10		24925	.0346			pyrite-chalcopyrite		
							mixture.		
210	10		24926	.0186					

District Riverside, Kelvin   Hole Number DDH K-4   Page Number 3

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu	Mo			Rock Type	Rock Description	Alteration	Mineralization
219								Aplite	Fine-grained, quartz-	Sericite-clay with local	Bleached with capping after pyrite-chal-
220	10	100	24927	.0598					rich aplite with moder-	quartz veinlets, as above,	copyrite as above with less disseminated
									ately abundant muscov-	with sericite less pervasive	pyrite voids with chalcopyrite capping.
230	10	100	24928	.0200					ite sheared, fractured	in aplite, 100% oxidized	
									as above.	quartz veinlets have seri-	
240	10	100	24929	.0215						cite halos 1/4 to 1/2" wide.	
											249-252' Local black molybdenum-rich
250	10	100	24930	.0353							stain (copper-bearing?) on fractures.
254.5								Precambrian	Brecciated, intensely	Pervasive sericite-clay	254.5 Black copper-bearing(?) molybdenum-
								Quartz	altered near contact.	near contact.	rich stain on fractures.
260	10	100	24931	.0420				Monzonite			
266								Fault Zone	Intense brecciation	Clay predominates.	Weak limonite in some fragments but no
									with angular quartz		general mineralization of rocks.
270	10	100	24932	.0303					monzonite fragments in		
									aphanitic groundmass		
280	10	100	24933	.0117					of clay-sericite.		
287								Precambrian	Medium-grained, porphy-	Propylitic alteration(?)	No sulfides, 100% oxidized.
290	10	100	24934	.0074				Quartz	ritic, fractured,		
								Monzonite	partially sheared.		
300	10	100	24935	.0110							
									Below 308'- less brec-	Magnetite prevalent to 327',	No sulfides, local weak molybdenum-rich
310	10	100	24936	.0053					ciation, more dense,	decreasing below in apparent	stain on fractures.
									fresh looking material.	propylitic alteration with	
320	10	100	24937	.0054						abundant chlorite, manganese	
										staining.	
330	10	100	24938	.0052							
340	10	100	24939	.0058							
350	10	100	24940	.0057							
360	10	100	24941	.0109							
									369-374' Minor brec-	Abundant calcite veinlets,	No apparent sulfide except minor limonite
									ciated diabase.	strongly chloritized, no	after pyrite, along diabase-monzonite
										magnetite; edpidote along	contact.
370	10	100	24942	.0046						contact with quartz monzon-	
										ite.	

District Riverside - Kelvin | Hole Number DDH K-4 | Page Number 4

Depth	Int.	%Core Rcvy	Samp. No.	Assays Cu	Assays Mo	Rock Type	Rock Description	Alteration	Mineralization
378.5						Diabase	Very fine-grained, black, moderately well-fractured.	Deep weak potassic to propylitic, magnetite, chlorite - fresh to partially altered feldspars, clay veinlets.	Limonite on all fractures, 100% oxidized, some probably capping after sparse chalcopyrite grains.
380	10	100	24943	.0130					
390	10	100	24944	.0127					
400	10	100	24945	.0164					
425	25	100	24946	.0142			Continues with gradually increasing brecciation, chlorite alteration on fractures and carbonate fracture fillings to 481'.	Chlorite-magnetite-carbonate.	No visible sulfides, local hematite suggests minor chalcopyrite-pyrite mineralization. 428' Minor malchite-azurite around oxidized chalcopyrite grain.
450	25	100	24947						
475	25	100	24948						
							481'-482' Red clay zone.		
						Precambrian Quartz Monzonite	Shattered, sheared.	Clay-chlorite; pervasive propylitic alteration.	No visable sulfides, strong molybdenum staining.
500	25	100	24949						

---------- 500' IS TOTAL DEPTH AS OF JUNE 21, 1973 ----------

District Riverside-Kelvin Hole DDH K-4 Page 5

Hole reentered July 6, 1974, at 500'.

Depth	Int.	Core Rcvy %	Samp. No.	Assays PPM Cu	Mo		Rock Type	Rock Description	Alteration	Mineralization
500'							Precambrian Oracle Granite	Medium-grained, red-stained, highly sheared, fractured quartz monzonite.	Propylitic to weak K(?); abundant chlorite and molybdenum on fractures, shear planes, abundant limonite after sulfides stains chlorite to dull brick-red color; 90-100% oxidized.	518 & 525' Capping on fractures after chalcopyrite noted (prevalent limonite) with relict grains chalcopyrite locally. Shearing has probably destroyed other veinlets, now not identifiable. Very minor disseminated pyrite(?), 100% oxidized, rock is too crushed for accurate determination.
525'	25'	50	28748	215						Molybdenite throughout as stain.
528'							Fault Breccia	Breccia gouge with angular to sub-rounded fragments. Fault appears to dip @ 50° to core axis.	Intense clay-chlorite caused by extreme granulation.	Limonite after pyrite, chalcopyrite(?), a red-buff transported limonite.
546'							Quartz Monzonite	Medium to coarse-grained, sheared, but with significantly less limonite after sulfides; rock is much lighter grey-red.	Propylitic with very minor limonite after pyrite; 100% oxidized; chlorite-molybdenum alteration predominates, plagioclase clouded to argillized.	Very minor, sparse limonitic voids after pyrite, no veinlets noted.
550'	25'	80	28749	151						
575'	25'	80	28750	83						
594'							Fault Breccia	Breccia gouge with very fine grained to cobble size, angular to sub-rounded fragments.	Granulated, flour matrix of clay, chlorite, sericite; molybdenum stained; 100% oxidized.	No observed increase of sulfides.
600'	25'	80	28751	85						
615'							Quartz Monzonite	As at 546'.	As at 546', with increased chlorite on fracture.	
625'	25'	80-90	28752	69						
648'							Diabase	Dark grey, fine-grained well-fractured diabase.	100% oxidized; intense clay-chlorite alteration of all minerals; very minor magnetite, chlorite strong on all fractures.	Minor disseminated grains pyrite, 100% oxidized with increasing red staining of chlorite with depth.
650'	25'	90	28753	84						

District Riverside-Kelvin Hole DDH-K-4 Page 6

Depth	Int.	Core Rcvy %	Samp. No.	PPM Cu	Assays Mo		Rock Type	Rock Description	Alteration	Mineralization
665'							Quartz Monzonite (Oracle Granite)	Coarse-grained, light pink to grey, stained brick-red primarily on fractures; sheared, broken, locally appears to have been remobilized and re-intruded by itself.	Propylitic: strong chlorite veining, minor clay, molybdenum on fractures.	Minor disseminated pyrite, 70-90% oxidized; local 1-2' zones contain 1-2% pyrite, no observed chalcopyrite.
675'	25	90	28754	70						
700'	25'	100	28755	17				709-710.5' Diabase dike at 25° to core with strong chlorite.		
725'	25'	100	28756	22				719-722' Alaskite-K-spar-quartz-sericite.	Below diabase, quartz monzonite exhibits large clots of chlorite and chlorite veinlets which have caused moderate breaking and brecciation when introduced; minor calcite and zeolite veinlets. 750' Minor epidote veinlets.	Sulfides - pyrite 100% oxidized, very minor, sparse grains, disseminated in rock; total sulfide <<1%.
750'	25'	100	28757	18						
775'	25'	100	28758	28						
								780-783' Alaskite as above.		
800'	25'	100	28759	18						
803'								Fault(?) breccia, strong gouge with small fragments at 30° (?).		
820'							Quartz Monzonite	As above.	As above.	
825'	25'	100	28760	19						
828'							Alaskite	Coarse-grained, perthite-quartz-sericite dike at 60° (?).	Sericite-pyrite.	Very minor limonite after probable copper.

District Riverside-Kelvin Hole DDH K-4 Page 7

Depth	Int.	Core Rcvy %	Samp. No.	Assays PPM Cu	Mo		Rock Type	Rock Description	Alteration	Mineralization
832							Diabase	Very fine-grained, dark black, highly broken.	Chlorite-clay pervasive with chlorite and calcite on abundant fractures. Strong magnetite.	No observed pyrite.
844'							Quartz Monzon-ite	As above	As above, but with increasing carbonate veinlets to total depth.	Occasional grain pyrite, 100% oxidized.
850'	25'	100	28761	48						
875'	25'	100	28762	22				Minor fragments of diabase at total depth, suggesting approach of another diabase dike.		

---875' IS TOTAL DEPTH---

KERR-McGEE CORPORATION

District: Riverside (Kelvin Area)
Hole No.: DDH K-8
Spudded: 08/19/76
Completed: 09/13/76
Total Depth: 802'
Driller: Joy Manufacturing
Logged By: G. J. Huerstel, Jr.

County: Pinal State: Arizona
Claim: Sec. 11 T.4 S.; R.13
Elevation:
Hole Size: 0-53' 4½" Rotary; 53-802' NX
Core Size: NX
Hole Angle: 90°
Collar Coords.: 3850 ft. FEL
1100 ft. FSL

Depth	Int.	Core Rcvy %	Samp. No.	ppm Assays Cu	Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
0-40	40	0								
50	10	100	36970	33		2.2	P€ ruin granite	Limonite-Jarosite stn.	Oxidized kaolinization of	No apparant sulfides. Minor amts of
							Appears to be	1-2" ortho phenocrys.	plag.Slight iron stain a-	Mn.Oxide occurs on fract.surfaces.
							block of granite	Abdt biotite.Intense	round biotite books.Ortho	Magnetite < 1%.
							resting on the	micro fract.generally	fairly fresh.Biotite appears	
							granite below.	@50° from vertical.	to be secondary.	
								52-52' badly broken.		
53										
							Granite	Well oxidized to about	Scattered very fine salmon	Magnetite w/biotite common occurrence.
								60' due to weathering.	colored vlts of ortho @ 1	
								Grades to unoxidized	per 3-5' Ortho grains fairly	
75	25		36971	52		5.8		granite. Slight folia-	fresh while plag is more	
								tion of granite evi-	clouded & somewhat kaolinized	
								denced by biotite.Bio.	Biotite fresh w/hint of pos-	
								growth trend approx.30°	sible chloritization of the	
87								from vertical.@87.5'	biotite.Plag.is chloritized	Py. first appears in broken zone @ 87'
								6" zone of massive	immediately below massive	Reaches possibly 1% in massive ortho
								coarse ortho salmon	ortho zone.	zone.
								colored.No good contacts.		
100	25		36972	34		5.4		1-2" vn w/fine grain	Mixed hematite & chlorite	Minor fine-grained py. on fracture.
								granitic mat'l.No bio.	stain on fracture.	
								@ 103' & 116'.		
111										
									Chlorite stained kaolinized	
									plag more evident.	
125	25		36973	33		8.5		3' shear zone w/slick-	Intense chloritization of	
								ensides running both	plag.& biotite.Orthoclase	
								verticle & horizontal.	is kaolinized.	
130								Granite is less altered	Felds are more fresh as is	Magnetite occurring w/biotite.
									biotite.	

District Riverside (Kelvin Area) Hole Number DDH K-8

Depth	Int.	% Core Rcvy	Samp. No.	ppm Assays Cu	Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
150	25		36974	32		4.8	Granite	Granite is more bleached	Clays developed thinly	
								Core broken along abd't	along fract.Chloritic	
								fractures running 34-40°	staining of plag is more	
								from vertical.	apparent.	
166								Rock more competitent	Chloritic & hematitic stain	
								for about 15'.	intense espc along fract.	
									Plag & biotite chloritized	
									Ortho becomes more kaolin'd	
175	25		36975	39		6.6				
183										
								Intensely fract.rock ap-	Good chlorite-hematite	
								pears to be cemented in	stain on fract.which often	
								place brecciated mat'l.	exhibit slickensides.	
189								Rock color dk.red & Grn		
							Fault gouge	Broken mat'l @ 1" in	Strong hematite staining	Minor fine-grained disseminated Py
192								diameter.		<1/2% @ 185'
							Granite	Fractures not as abd't	Remanent biotite completely	
								but still have hem &	altered to chlorite.Slight	
								chlorite stained kaolin	kaolinization of ortho.	
								coating.	Plag also kaolinized.Minor	
									sercite developed about	
220									chloritized biotite books.	
225	25		36977	33		5.0		Rock slightly fresher	Fresh orthoclase while	Fine-grained py.@ 220' 7 1/2%.
									plag & bio more fresh than	
236									above.	
								Numerous fractures are	Fractures have good sercite	Py. is sprinkled lightly in some fract.
								common. Core completely	chlorite devel.which are	and also occurs in strongly chloritized
								breaks along fractures.	stained dk.chloritic green	biotite books.
									or hem red.Ortho content	
									incr.& appears to be pos-	
									sibly secondary.Bio & plag	
250	25		36978	60		6.3			strongly chloritized.	
								3 1/2' recemented fault	Complete chloritization of	
								gouge followed by 2'	biotite & plag.Ortho is	
								broken fault mat'l.	slightly kaolinized. Ser-	
								Verticle slickensides	cite coating on fract are	
								developed on mat'l in	calcite.	
256								broken zone.		
								Rock appears fresher.	Noticable incr.in qtz. Ap-	
									pears that qtz replacing	
									chloritized material.	

District Riverside (Kelvin) Hole Number DDH K-8 Page Number 3

Depth	Int.	% Core Rcvy	Samp. No.	ppm Assays Cu	Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
275	25		36979	67		7.3	Granite		Qtz flooding not as apparent.Plag is kaolinized while biotite completely chloritized.	Chalcopyrite smear on qtz grain @ 293' calcite vlts @ 292'.
296							Broken zone.	Fault gouge broken mat'l & recemented to 320'		
300	25		36980	44		5.8			Complete kaolinization of plag. Ortho mod.kaolinized Biotite-mag.completely to chlorite.Hem.stain on frac.	
325	25		36981	38		5.6	Granite	Rock darker in color. Predominately a dark green color w/few zones red coloration.Hematite staining of sercite on fractures.	Magnetite vlts cross cut core @ various angles. Slight silicification in zones of mag.vning at at 333'.Silicification appears to incr.competence of rock thus preserving felds & mag from oxidizing & ground water fluids.Frac coated by calcite enriched hem.Stained clays.	Magnetite vlts w/py.sprinkled about vlt perimiter.Total sulfides & mag > 1% Dessiminated py.approached 1% around 354'.
350	25		36982	125		4.9		Texture of granite nearly disappears.	Mod.silicification of granite destroyes much of regrain boundaries.	Magnetite & py. in very fine vnlts. Sulfide <.5%.Magnetite 1-2%.
353								Recemented breccia. granitic fragments fairly rounded.Med.grey color	Rock intensly silicified.	Py.content up noticably to 1%.
356								Dk.green gray color rounded breccia frag. recemented.	Pervasive chlorite-magnetite alteration.	Magnetite makes up much of open space between breccia fragments. Pyrite at around 1%.
359							Broken zone.	Slickensides demonstrate lateral movement in 3' zone of broken materal.	Hematitic stain on fracture planes.	
361							Granite	Pale green color rock intensely fract.but is still in place.	Strong chloritization and silicification.	Magnetite disappears below broken zone at 359'. Pyrite down to >1/2%.
375	25		36983	32		3.7		Granitic texture return to rock.Grains will defined.	Plag & biotite mod.chloritized.Ortho is fairly fresh.	Magnetite associated w/chloritized bio.
376							Broken zone.	3' zone of broken frag.	Hem. staining of frac.sur.	

District Riverside (Kelvin)

Hole Number DDH K-8

Page Number 4

Depth	Int.	% Core Rcvy	Samp. No.	ppm Assays Cu	Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
387										
							Granite	Finer grained texture.	Ortho.clooding 387-389'	
								Biotite books strongly	Biotite-magnetite flooding	
								display 40° from verti-	389-390'.	
390								cal orientation.		
								Back to med.texture	Magnetite & biotite slightly	Magnetite associated w/biotite.
400	25		36984	34		6.1		granite.	chloritized.	
									Slight silicification ap-	Py mineralization more related to vlts.
419									parent.Bio&plag chloritized	Pyrite > 1/2%.
425	25		36985	29		6.0	10'broken zone	Weathered granite frag.	Felds kaolinized.Fine near	Slight py.mineralization associated w/
							Granite	Intense weathering below	vertical veining contains	chlorite veins.
								broken zone.Well fract.	chlorite & sericite,some	
440									hematite staining	
								Hematite staining in		
								pervase micro fract.		Fine py. seen associated w/fract.
450	25		36986	27		5.3		gives overall red color.		w/chlorite stain < 1/2%.
								Slightly fresher granite	1-2" clots of slightly	
								less fracturing.	kaolinized 2ndary ortho	Magnetite associated w/biotite < 1%.
									are common.Fresh biotite	
									no longer exhibits prefered	
									50° from vert.Plag intense	
									ly kaolinized.Incr silica	
									content occasional near	
									vertical vlts contain	
466									kaolin.	
								Granite no longer ap-	Numerous siliceous vns cut	Scattered py. in siliceous vns < 1% of
475	25		36987	38		5.3		pears fresh. Red appear	core @ steep angles.Mag.	rock. Slight hint of chalcopyrite on
								ance due to sudden incr	make up much of vein mat'l	pyrite.
								hematite in fractures.	50-60%.Sericite-chlorite	
									seen occasionally about	
									siliceous vns.Plag & bio	
									are chloritized.Ortho ap-	
490									pears fairly fresh.	
								Good hemitite staining	Mafics make-up 20% of rock	Sulfides up to 1-1.5%, 10% of sulfides
								on fract.still present	Appears to be chlorite	are chalcopyrite,rest in pyrite.Clots
								Granitic texture more	after mag.in form of coarse	of dissiminated sulfides are more
								coarse.	textured clots.Plag not	coarse. Slight halo of hem seen occas-
									evident.Rock mostly ortho.	about pyrite.
									strongly seriticized in	
									ctr.but only slightly ser-	
									iticized on perimeter.	

District Riverside (Kelvin)

Hole Number DDH K-8

Page Number 5

Depth	Int.	% Core Rcvy	Samp. No.	ppm Assays Cu	Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
500	25		36988	140		4.3	Granite.	Granite has overall green color.	Ortho grains fairly fresh in ctr of phenocrysts but perimeters are green stain sericite. Tiny specks of chlorite intergrowth occur within ortho grains. Chlorite makesup most intergranular mat'l.	Disseminated sulfides @ 1% of rock. Chalcopyrite <10% of sulfides.
517								Rock very dk. 10% of rock mafics. Fractures now dk. green due to chloritic coating.	Intense biotization w/mag. Large clots fresh ortho. appears secondary. Plag is kaolinized.	No appreciable sulfides.
525	25		36989	63		6.4		Fresher composition & colored granite.	Mafics compose 3-5% of rock Ortho predominate. Felds appear secondary. Qtz content incr. Silicification of felds is taking place. Vnlt cuts core at right angle @ 523'. Calcite in clay coating fract.	Magnetite comprises most of mafics. Mafics 5% of rock.
550	25		36990	33		4.5		Core much the same. Greenish tint at 527-534 and 544-549'.	Mafics become chloritized. Silica content down. Plag. appears chloritized. 1/4" calcite vn running 10° from vert @ 534'. Chloritic alteration envelopes vein.	No appreciable sulfides.
559								4' slickenside zone on near vertical fract. that trends 20-30°.	Slickensides mainly coated w/calcite & chloritic clay	No appreciable sulfides.
575	25		36991	19		5.7				
582								Rock more drab or light in color.	Moderate silicification especially of plag & a lesser degree. Ortho gives rock lighter color. Clay only slightly chloritized.	Magnetite accounts for about 1/2 of total mafics. Rest is biotite.
594								Rock moderately well fractured. indication of only slight movement due to frag. of slickensides	Intense kaolinization of plag. Mod. kaolinization of ortho. Numerous fract. Thin coating of calcite present on many fractures.	

		Core Rcvy	Samp. No.	ppm Cu	Assays Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
	25		36992	23		6.4	Granite	Rock takes on slightly darker tint due to chloritization.	Broad vn @ 606' has 2ndary ortho ctr enclosed by envelope of magnetite. Occasional stringer of what appears to be 2ndary bio. that is now chloritized. Mafics including plag are chloritized.	Slight incr in dessiminated py.associated w/incr in mag.mineralization. Sulfide ∠1%.
625	25		36993	18		5.2	Fault	Fracturing incr until @ 625' 1' zone of angular broken mat'l.	Fault fragments slightly kaolinized accompanied by little chlorite stain.	Sulfide & mag center down < 1/2%
627								Fract.intensity gradually decr,thus rock appears fresher.	Fine vns mag cut core.2ndary ortho incr until 642' @ 80% of rock.Qtz & mafics remain.	Py.flecks associated w/fract w/mag & chlorite.
650	25		36994	24		4.9		Gradual noticable incr of orange-tan ortho growths.	Ortho content down to 40-50%.Some qtz flooding associated w/mag vnlts.Plag grains intensely kaolinized	Near vertical mag vnlts @ 650'. Sulfide content > 1/2%
669							Granite	Common granitic texture w/occasional large 1" clots of secondary ortho Slightly green tint due to chloritization of bio and plag.	Plag kaolinized. Along fract often chloritically stained.Good chlorite stained mat'l buildup on fract.Vertical qtz-mag vn @ 669-674' At 674' calcite vn cuts core & slight ortho flooding occurs near vein.	Mag predominate mafic.@674' massive mag flooding.Chalcopyrite:py ratio 50:50 Sulfides associated w/qtz-ortho vn within massive magnetite.
675	25		36995	36		6.4		Rock grey-Dk grey intensely fract & rehealed	Intense chloritization of felds & mafics.Slight incr of qtz & py near vns of same.Alteration may include slight seritization of fledspars.	Total sulfide > 1/2%.Py.is dominate sulfide.
686								33' gouge or fault mat'l Slickensides show movement gen.lateral	Felds & mafics intensely chloritized.Good kaolin-chlorite build-up on some fract.Hem.stain seldom appears on fractures.	Occassionally fine py.grains appear in rehealed fault material.
700	25		36996	149		5.9				

District Riverside (Kelvin)

Hole Number DDH K-8

Depth	Int.	% Core Rcvy	Samp. No.	ppm Assays Cu	Mo	cU_3O_8	Rock Type	Rock Description	Alteration	Mineralization
725	25		36997	25		5.5	Granite	Fewer fractures, Core more competient.	Plag intensely kaolinized w/some chlorite stain.Ortho slightly-moderately kao-linized near fract.of ser-cite-clay & some calcite.	Sulfides Nil.Magnetite content down.
733								Broken zone 733-737' & 766-768' Dk gray-green color.Slickensides dem-onstrates horizontal movement. Rock between zones same as 725'	Intense chloritization of all feldspars.	
743								1 1/2' zone predomin. ortho.Orange-tan color.	Ortho flooding plag & ma-fics replaced. Ortho & qtz dominate minerals.	Sulfide & magnetite Nil.
750	25		36998	31		12.0				
768								Rock fairly compitent.	Slight ortho flooding.Plag and bio chloritized.Ortho appears to be undergoing slight slicification & seritization.	Mag-bio ratio 50:50
775	25		36999	48		6.3		Vnlts approx 30° from vertical.Occuring ap-prox. 1 per inch.	Incr in qtz-py-chlorite. vns mag.appear to have been chloritized.	Py. predominately vn. <1/2%
784								Good clay-sericite coat on fracture gives rock light color.	Mod.silicification of feld Mag & bio chloritized white Mag fairly fresh.Mafic content up to 7-10% of rock	Fract appears to be unmineralized out-side of calcite enriched clays. Mag. predominate mafic. Sulfide content NIL but chalcopyrite is predominate.
802	27		37000	27		4.7				
T.D.								TOTAL DEPTH	TOTAL DEPTH	

KELVIN PORPHYRY COPPER PROSPECT

GULF MINERAL RESOURCES REPORTS

Report on Geology and 1978 Drilling Results

1977 Report on the Geology, Geophysics and Exploration Potential

of the Kelvin Porphyry Copper Prospect

FINAL REPORT ON THE GEOLOGY AND 1978 DRILLING AT THE KELVIN (RIVERSIDE) PORPHYRY CU-MO PROSPECT, PINAL COUNTY, ARIZONA

Tucson Area Office

Joe Wilkins
Tom L. Heidrick
Greg R. Wessel

February, 1979

TABLE OF CONTENTS

INTRODUCTION AND GEOLOGY

Geologic mapping and geochemical sampling in the northern Tortilla Mountains (Fig. 1) during the summer of 1977 delimited a somewhat fragmented but basically upright porphyry copper system lying within the submitted Kerr-McGee claim block (Fig. 2). Detailed geologic mapping and subsequent cross section construction showed the system as emplaced into Precambrian Ruin granite, an aplitic phase of the Ruin, diabase "sills", and Laramide age dikes (Figs. 3 and 4). Alteration-mineralization studies, geochemical dispersion patterns, complex resistivity, and ground magnetometer data refined this interpretation and indicated that the system was largely centered in the SW¼ of section 12, T4S, R13E (Fig. 3, DDH GK-2). The strongest alteration at the surface is pervasive quartz-sericite-pyrite showing marked enhancement along ENE-trending joint sets, veins, and fault-veins. The quartz-sericite-pyrite alteration is surrounded by an aureole of mixed phyllic-propylitic assemblages, which in turn grades latterally (outward) into a propylitic dominated assemblage and finally into relatively unaltered host rocks. Alteration was expected to change with depth to a low-sulfide potassic alteration assemblage associated with copper-molybdenum metallization. A weak but uneconomic chalcocite blanket outcrops locally at the surface.

An ENE-trending fracture set pervades the entire region and is best developed where alteration-mineralization intensifies (Fig. 3). Alteration and mineralization is well developed along coeval sets of subvertical ENE-trending veins and fault-veins. Numerous vertical to subvertical quartz monzonite, hornblende monzonite, quartz latite, and hornblende latite porphyries share the ENE azimuth.

The porphyry copper system appears to have been emplaced into a N- to NNW-trending, east-facing monoclinal fold (termed the Riverside monocline) which is defined on a regional scale by steeply dipping to overturned ridges of Precambrian Apache group and diabase sills, as well as Paleozoic sedimentary rocks. In the Kelvin (Riverside) area, the position of the fold is defined by a series of N- to NNW-trending axial plane faults, zones of intense cataclasis, and the overall monoclinal attitude of diabase sills (subhorizontal to the west and steep to overturned to the east).

Several low-angle decollement surfaces are recognized immediately west of the proposed prospect area (Fig. 3). In particular, the Ripsey Wash and Jeep Trail faults and their coextensive zones of post-mineral breccia are interpreted as marking the trace of significant westward propelled hanging-wall detachments. In addition, several small discontinuous gravity slide surfaces are present along the east side of the prospect area with indicated movement toward the east into the San Pedro rift valley. As for detachment faults beneath the proposed target, none are known to outcrop anywhere in the Kelvin (Riverside) prospect area. The presence of such low-angle structures were suggested by Kerr-McGee explorationists and were viewed as potentially underlying the entire prospect area. The presence of subvertical ENE-trending fracture and porphyry zones, flat lying diabase sheets, along with the near vertical contacts of the Riverside breccia pipe (Figs. 3 and 4) were interpreted by us as indicative of nonrotation. Figure 5 summarizes our pre-drilling interpretation of the Kelvin (Riverside) structure, alteration-mineralization zoning, and relative position of the high-grade protore Cu-Mo target sought.

1978 DRILLING RESULTS

Protore Cu-Mo metallization lying within reactive diabase sills showing potassic alteration comprised the exploration target at Kelvin (Fig. 5). Drill holes GK-1 and GK-2 were layed out so as to test the potassic core of the upright porphyry copper system. Hole GK-3 was an alternate site designed to test for high-grade Cu-metallization beneath outcropping pyritic crackle breccia. Hole GK-4 was drilled to perform the required maintenance work on an Arizona State mineral lease in section 10.

DDH GK-1 (Fig. 6) was designed to encounter the reactive diabase sill at the interface between the phyllic and potassic alteration zones. Our proposed target depth was between 1500 and 2000 feet. The hole was collared in mixed phyllic-propylytically altered Ruin granite containing moderate Cu dispersion and high Mo/Pb geochemical ratios just east of the Jeep Trail fault zone. Propylytically altered Ruin containing 100-400 ppm Cu and 2-5 ppm Mo was encountered between 0 and 360 feet. A flat-dipping (20^{o}), propylytically-altered, and cataclastically deformed diabase sill was encountered from between 360 and 905 feet. As suspected, this diabase proved receptive and contained 2-3 times more Mo and Cu as the overlying or underlying Ruin granite. Between 905 and 2000 feet, the hole penetrated cataclastically deformed and propylytically altered to fresh Ruin granite with background levels of Cu, Mo, and Pb.

DDH GK-2 (Fig. 7) was placed at the eastern most boundary of the Gulf/Kerr-McGee joint claim block (Fig. 2) in order to test the proposed potassic altered core. The target depth was 1500 to 2000 feet deep. GK-2 was collared in phyllically altered Ruin granite associated with a strong Mo/Pb anomaly and moderate Cu geochemistry. Phyllically altered aplitic Ruin was present from collar to 860 feet. A 35 foot thick sheet of diabase was encountered overlying 45 feet of normal Ruin granite at 450 feet. Mixed phyllic-proplytically altered Ruin granite occurred between 860 and 1340 feet with a 25 foot thick diabase sheet at the base. From 1365 to 2260 feet the propylytically-altered Ruin granite gradually became fresher with the bottom of the hole in very weak proplytically altered to fresh Ruin granite. Within the phyllic zone, the Cu varied from 200 ppm to 0.12 - 0.14%, while Mo ranged from 25 to 167 ppm, and Pb from 7 to 508 ppm. No significant increase in metallization was encounterd in either diabase. Very little variation in the Cu, Mo, or Pb was noted in the mixed phyllic-propylytic or propylytic-fresh alteration zones with Cu at 100 ppm, Mo at 1-5 ppm, and Pb at 10-15 ppm.

DDH GK-3 (Fig. 8) was an alternative test site collared within a "pipe-like" crackle breccia composed of phyllically altered fragments of Ruin granite and diabase containing 1-3% pyrite. Target depth was 500 to 1000 feet with protore chalcopyrite within phyllic-potassically altered breccia as the target. The hole was rotary drilled to 72 feet and surface casing set at that point. With increasing depth, the hole passed progressively from pyritic crackle breccia to sheared and propylitically altered Ruin granite. Total fracturing and veining decreased as well with depth and at 390 feet the Ruin granite appears relatively fresh and contains occasional veinlets of epidote calcite-chlorite-specularite. GK-3 was bottomed at 775 feet in relatively fresh unsheared Ruin granite. Cu, Mo, and Pb were relatively uniform with 25 ppm Cu, 1-5 ppm Mo, and 10-20 ppm Pb.

DDH GK-4 (Fig 8) was drilled to perform the required maintenance on Arizona State mineral lease in Section 10, T4S, R13E. The entire hole from 0 to 223 feet was in weakly propytytic Ruin granite containing less than 100 ppm Cu, 1-2 ppm Mo, and 7-15 ppm Pb.

GEOLOGIC SYNOPSIS

All 4 holes drilled at Kelvin show decreasing fracture intensities, alteration, and mineralization with increasing depth; phyllic alteration yeilds to propylytic and propylitic to fresh, total sulfides decrease from 1-2% to trace amounts, copper decreases from 0.2 - 0.14% to less than 100 ppm while molybdenum goes from +100 to less than 10 ppm at TD. As shown in Figure 9, this tendency for decreasing alteration, mineralization, geochemical dispersion, and the "floored" nature of crackle breccia zones suggest that the supposedly Kelvin(Riverside) porphyry system is rotated some 70-80^{0} clockwise when looking NNW. Consequently, the alteration-geochemical dispersion patterns observed at the surface represent a sub-vertical slice from top to bottom through the systems rather than a horizontal slice across its top.

Since the ENE-trending dikes, veins, fault-veins and planar joint sets are subvertical and conform to well-established regionally controlled fracture trends, the rotation must have taken place along an axis perpendicular to this strike (i.e. NNW). Rotation of the system took place after Laramide time (55my) but before the deposition of the San Manuel formation (17-22my). Subsequent low-angle movement along the Jeep Trail and Ripsey Wash faults plus minor eastward movement into the San Pedro rift occurred after main stage rotation in Post-San Manual time since large blocks of San Manual are involved (Fig. 4). A major low-angle fault apparently terminates at the San Pedro rift as postulated in Figure 9.

The Riverside-Kelvin monocline originally defined by an east-facing monoclinal fold in the diabase, now appears to be a "⌐" shaped configuration of sills (now sub-vertical) and their feeder dikes (now flat-dipping). The sill portion, orginally thought to be the east-face of the monocline, dips steeply into the San Pedro, while the dike portion, orginally thought to be the axial limb of the monocline, has a flat sill-like configuration.

As shown in the geologic cross-section (Fig. 9), post-Laramide rotation and subsequent denudational faulting along the Jeep Trail and Ripsey Wash faults have removed the productive portion of the Kelvin system, leaving a thin, nonproductive slice of phyllically and propylytically altered Ruin granite behind. The top and the proposed productive center of the system apparently has been transported to the west beyond Ripsey Wash, and if present occurs as complex slices beneath fresh unaltered rocks in the Greyback Peak area.

SUMMARY AND CONCLUSIONS

The areal geology, geochemical dispersion patterns, geophysical prospecting techniques, and a 4-hole drilling program totaling 5268 feet, have defined a rotated and complexly faulted porphyry copper system at Kelvin, Pinal County, Arizona. Drill holes GK-1 and GK-2 collared in an alteration patch associated with strong Cu and Mo but low Pb geochemical dispersion showed decreasing alteration (phyllic to weak propylytic) sulfide content, plus Cu-Mo metallization with increasing depth. Drill hole GK-3 collared in a pyritic crackle breccia likewise drilled out of the same with depth indicating a "floor" created by post-emplacement rotation.

Drill holes GK-1 and GK-2 have effectively eliminated the possibility of a deep protore porphyry copper system at Kelvin and GK-3 has eliminated the breccia pipe potential. Although Kerr-McGee's holes K-1 and K-3 intersected sub-ore grade copper in thin slices west of the Jeep Trail decollement, Kerr-McGee holes K-2 and K-4 thru K-8 have effectively negated the possibility of a large ore-grade slice existing between Ripsey Wash and the Jeep Trail fault.

It is possible that ore-grade slices of the Kelvin(Riverside) system exist on Kerr-McGee/Gulf joint venture ground in Section 21 and 22 (1 mile south of the Cities Services drilling). Potential targets however are quite deep, structurally complex, and not attractive enough to justify additional drilling at this time.

RECOMMENDATIONS

Compiled and synthesized geologic, geochemical, geophysical, and drilling information constitute a data base adequate to eliminate the existence of significant ore-grade Cu-Mo metallization within the Kelvin (Riverside) claim block (Fig. 2). It is recommended, therefore, that Gulf counsel notify our farmout partners (Kerr-McGee) that GMRC is no longer interested in pursuing metals exploration on subject property. Complete sets of factual data including drill logs, assays of core, and geophysical survey information with reports are included herewith should Kerr-McGee request the same (Appendices A, B, and C respectively).

Tucson Area Staff

TABLE I

DRILL-HOLE SUMMARIES

Hole no.	Attitude	Depth (ft)	Alteration	Average ppm Cu	Best Intercept
AREA WEST OF RIPSEY WASH					
Cyprus DDH 1972					
KE-1	60°N	2500'	strong phyllic & strong potassic	360 40ppm Mo	1750-2100' 948 Cu, 51 Mo
Tipperary Land & Exploration RDH 1970					
T-1	vert	1400'	N/A	N/A	N/A
T-2	vert	1635'	"	"	"
Minbanco RDH Pre-1970					
J3	vert	1165	N/A	N/A	N/A
J9	vert	2320'	"	"	"
AREA EAST OF RIPSEY WASH					
Kerr-McGee DDH's 1972-1976					
K-1	vert	1500'	st.phyllic-wk.pot.	890	800-1030',0.26%
K-2	vert	1377'	propy-phyllic	188	775-920', 0.05%
K-3	vert	1386'	propy-phyllic	810	640-790', 0.26%
K-4	vert	875'	propylytic	470	150-190', 0.17%
K-5	vert	1497'	wk.phyllic-propy	130	20-120', 0.05%
K-6	vert	500'	weak propy	44	420-470', 0.01%
K-7	vert	1077'	weak propy	130	500-505',400ppm
K-8	vert	802'	phyllic-propy	44	686-700',150ppm
Inspiration DH 1966					
ICC-1	vert	400±'	N/A	N/A	N/A
ICC-2	vert	unk.-validation	"	"	"
Occidental Minerals DDH's 1967-1968					
OX-1	60°S	415'	N/A	N/A	N/A
OX-2	60°S25°E	500'	"	"	"
OX-3	60°S	396'	"	"	"
OX-4	60°S5°E	500'(unk)	"	"	"
Pre-Occidental CDH's 1949					
CDH-1	vert	520'	N/A	N/A	N/A
CDH-3	vert	735'	"	"	"
CDH-6	vert	457'	"	"	"
CDH-8	vert	352'	"	"	"

TOTAL FOOTAGE DRILLED

Cyprus-Tipperary-Minbanco	8020 ft.
Kerr-McGee	9014 ft.
Inspiration	400 ft.
Occidental	1811 ft.
1949 CDH's	2064 ft.
Total known Kelvin	22309 ft.

Client Gulf Mineral Resources Date September 28, 1978 RMGC Job No. 78-15-30T

KELVIN DDH 1

	Sample Number	Cu ppm	Pb ppm	Mo ppm
AZ.KT-	19/50	205	15	-1
	50/100	120	15	-1
	100/150	50	10	5
	150/200	110	15	4
	200/250	400	15	3
	250/300	305	35	1
	300/350	20	15	-1
	350/400	295	20	11
	400/450	150	25	2
	450/500	95	25	-1
AZ.KG-	100/110	65	10	-1
	150/160	110	15	-1
	200/210	55	10	5
	290/300	275	10	1
	300/310	145	15	7
	400/410	155	20	-1
	440/450	195	15	-1
	500/510	145	20	21
COMPOSITES				
AZ.KJ-	50/80 80/100	130	20	-1
AZ.KG- KJ- KJ KJ	100/110 110/120 120/140 140/150	35	10	7
AZ.KG- KJ KJ	150/160 160/180 180/200	250	10	5

Client Gulf Mineral Resources Date September 28, 1978 RMGC Job No. 78-15-30T

	Sample Number	Cu ppm	Pb ppm	Mo ppm
COMPOSITES				
AZ.KG-	200/210	230	15	1
KJ	210/230			
KJ	230/250			
AZ.KG-	290/300	205	10	-1
KJ	310/330			
KJ	330/350			
AZ.KG-	300/310	55	15	1
KJ	310/330			
	330/350			
AZ.KJ-	350/370	325	20	-1
	370/390			
	390/400			
AZ.KG-	400/410	175	20	2
KG	440/450			
KJ	410/425			
	425/440			
AZ.KJ	450/470	120	25	3
	470/485			
	480/490			
	490/500			

By [signature]
Parry D. Willard

TUCSON OFFICE

ROCKY MOUNTAIN GEOCHEMICAL CORP.

2561 EAST FORT LOWELL ROAD · TUCSON, ARIZONA 85716 · PHONE: (602) 795-9780

Certificate of Analysis

RMGC Numbers:

Local Job No.: 78-15-30?

Foreign Job No.:

Invoice No.: T8294

Date: September 28, 1978

Client: Gulf Mineral Resources
2015 N. Forbes
Suite #105
Tucson, Arizona
85705

Client Order No.: 21148

Report On: 40 samples

Submitted by: Tom Heidrick

Date Received: September 7, 1978

Analysis: Cu, Pb, Mo

Analytical Methods: Determined by Atomic Absorption

Remarks: Kg and Kj samples assayed in 50' intervals.

cc: Enc: 2
RMGC/SLC
file

PDW/ls

ND = None Detected   1 ppm = 0.0001%   1 Troy oz./ton = 34.286 ppm   1 ppm = 0.0292 Troy oz./ton

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

WIL WRIGHT
ARIZONA REG. NO. 5875

P.O. BOX 7517
TUCSON, ARIZONA 85725

710 E. EVANS BLVD.
PHONE 602-294-5811

Gulf Minerals Resources
G. Wessel

JOB# 022225 Continued
RECEIVED
REPORTED

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD PPM	COPPER PPM	ZINC %		MOLYBDENUM PPM
1800-1850			9	106			4
1850-1900			9	138			11
1900-1935			8	141			< 1
1935-1950			8	146			2
1950-1952			7	373			4
1952-1957			6	244			5
1957-1981			8	95			< 1
1981-1983			7	95			9
1983-1995			6	85			3
1995-1997			8	46			< 1
1997-2000			8	64			< 1

REGISTERED ASSAYER
CERTIFICATE NO.
8858
Dnyanendra
Amrutlal Shah
DATE SIGNED
Arizona U. S. A.

[illegible signature]
10-16-78

AFE # 8214

Customer Copy - Please pay from this
Shelley

CHARGE $ 273.00

Pb-39 @ $1.50, Cu-39 @ $1.50, Mo-39 @ $2.50, Prep-39 @ $1.50

INVOICE

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

ACCT 0016

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

WIL WRIGHT
ARIZONA REG. NO. 5875

REGISTERED ASSAYERS

P.O. BOX 7517
TUCSON, ARIZONA 85725

710 E. EVANS BLVD.
PHONE 602-294-5811

Gulf Minerals Resources
Mr. Greg Wessel
2015 N. Forbes Blvd.-Suite 105
Tucson, Arizona 85705

JOB# 022225
RECEIVED 10-10-78
REPORTED 10-16-78

PO# 21164

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD PPM	COPPER PPM	ZINC %		MOLYBDENUM PPM
KEG-1-J;							
510-525			16	314			11
525-540			14	204			25
540-550			10	92			5
KE-1:							
550-600			9	220			7
600-650			10	101			2
650-700			11	174			10
700-750			12	312			19
750-800			10	199			9
800-850			12	227			9
850-901			18	361			3
901-950			7	56			< 1
950-1000			6	80			1
1000-1050			9	131			2
1050-1100			10	70			< 1
1100-1150			8	48			2
1150-1200			8	56			< 1
1200-1250			7	55			< 1
1250-1300			8	56			< 1
1300-1350			7	100			7
1350-1400			8	70			1
1400-1450			6	66			3
1450-1500			8	66			< 1
1500-1555			9	64			1
1550-1600			7	48			< 1
1600-1650			8	69			< 1
1650-1700			9	88			< 1
1700-1750			8	70			< 1
1750-1800			7	66			< 1

CHARGE

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, INC.

REGISTERED ASSAYERS
P. O. BOX 7517
TUCSON, ARIZONA 85725

710 E. EVANS BLVD.
PHONE 602—884-5811
884-5812

WIL WRIGHT
ARIZONA REG. NO. 5875

DNYANENDRA A. SHAH
ARIZONA REG. NO. 8888

Gulf Minerals Resources
Mr. Greg Wessel
2015 N. Forbes Blvd.-Suite 105
Tucson, Arizona 85705

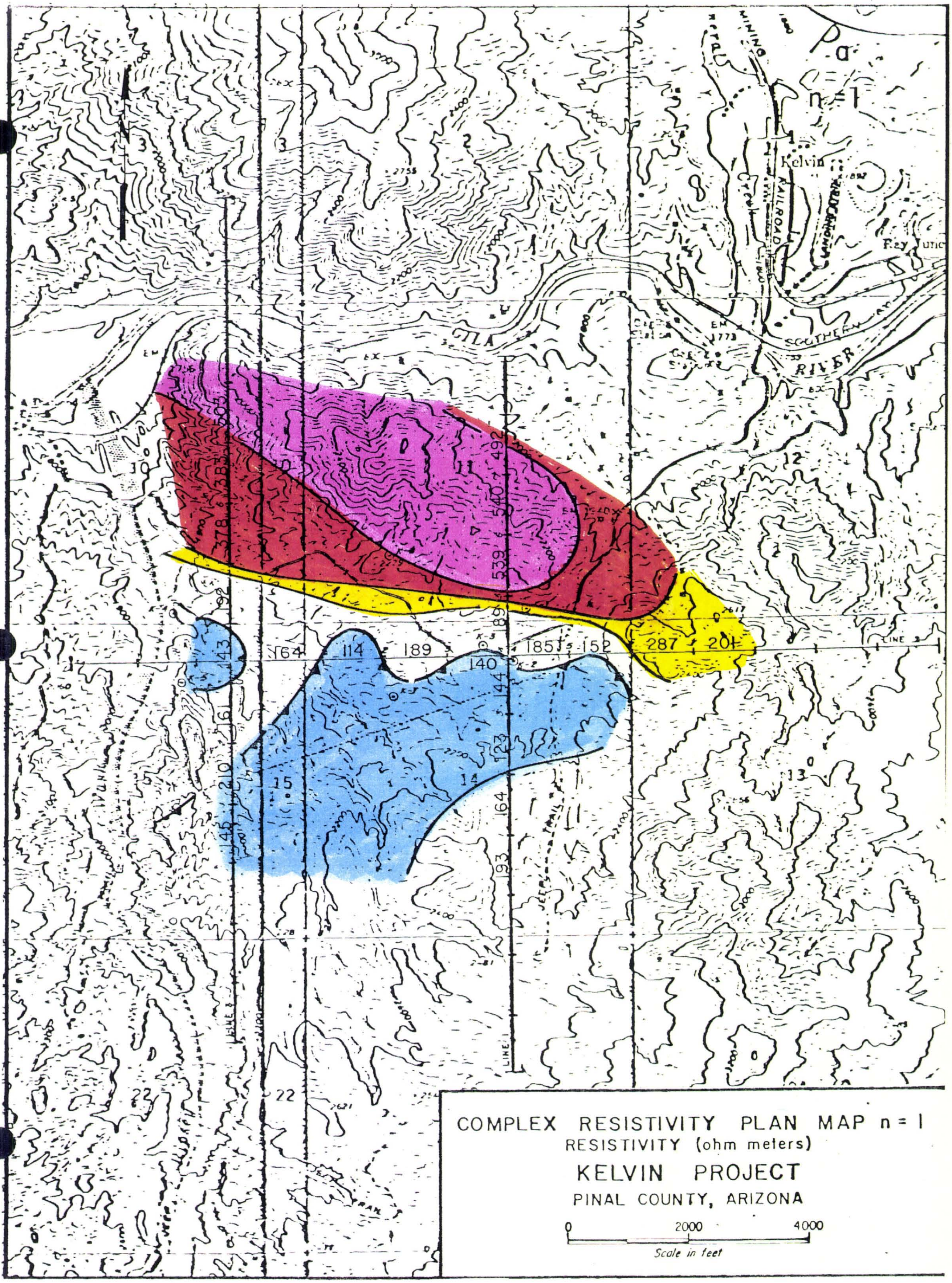
JOB # 022513
RECEIVED 1-5-79
REPORTED 1-11-79

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD PPM	COPPER PPM	ZINC PPM		MOLYBDENUM PPM
KE-4:							
0-50			12	74			3
50-100			13	93			3
100-150			11	97			3
150-200			9	62			2
200-233			8	64			4

REGISTERED ASSAYER
CERTIFICATE NO. 8888
Dnyanendra Amrutlal Shah
DATE SIGNED 1-11-79
Arizona U. S. A.

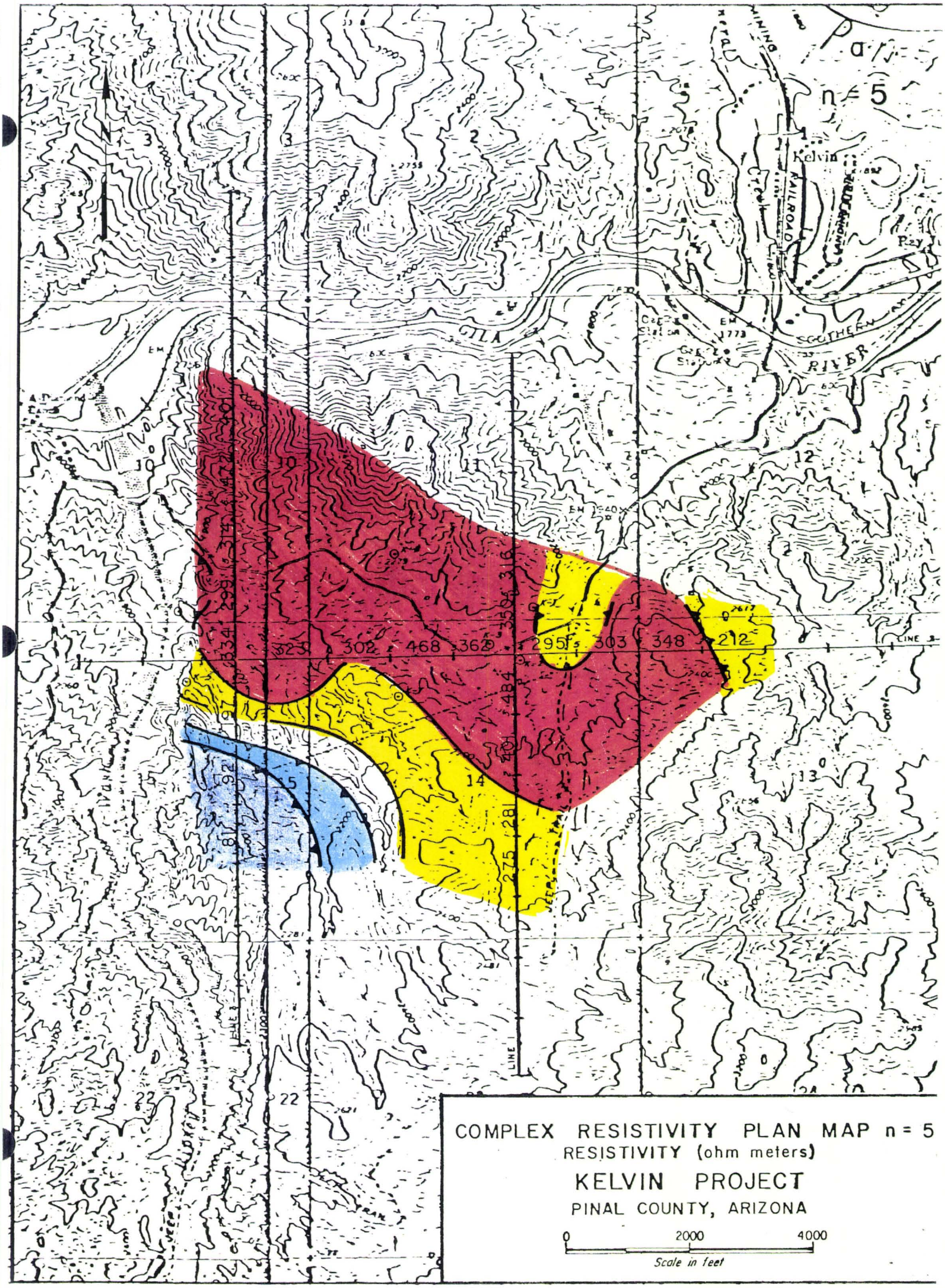
1 ppm = 0.0001%   1 troy oz./ton = 34.286 ppm   1 ppm = 0.0292 troy oz./ton

* Gold and Silver reported in troy oz. per 2,000 lb. ton.


Kelvin
RAILROAD
GILA
RIVER
SOUTHERN
LINE 3
LINE 2
LINE 1
COMPLEX RESISTIVITY PLAN MAP n = 1
RESISTIVITY (ohm meters)
KELVIN PROJECT
PINAL COUNTY, ARIZONA
0
2000
4000
Scale in feet
n=1
378
492
540
539
143
164
114
189
140
185
152
287
201
161
210
145
144
123
164
193

COMPLEX RESISTIVITY PLAN MAP n = 3
RESISTIVITY (ohm meters)
KELVIN PROJECT
PINAL COUNTY, ARIZONA

0 2000 4000
Scale in feet

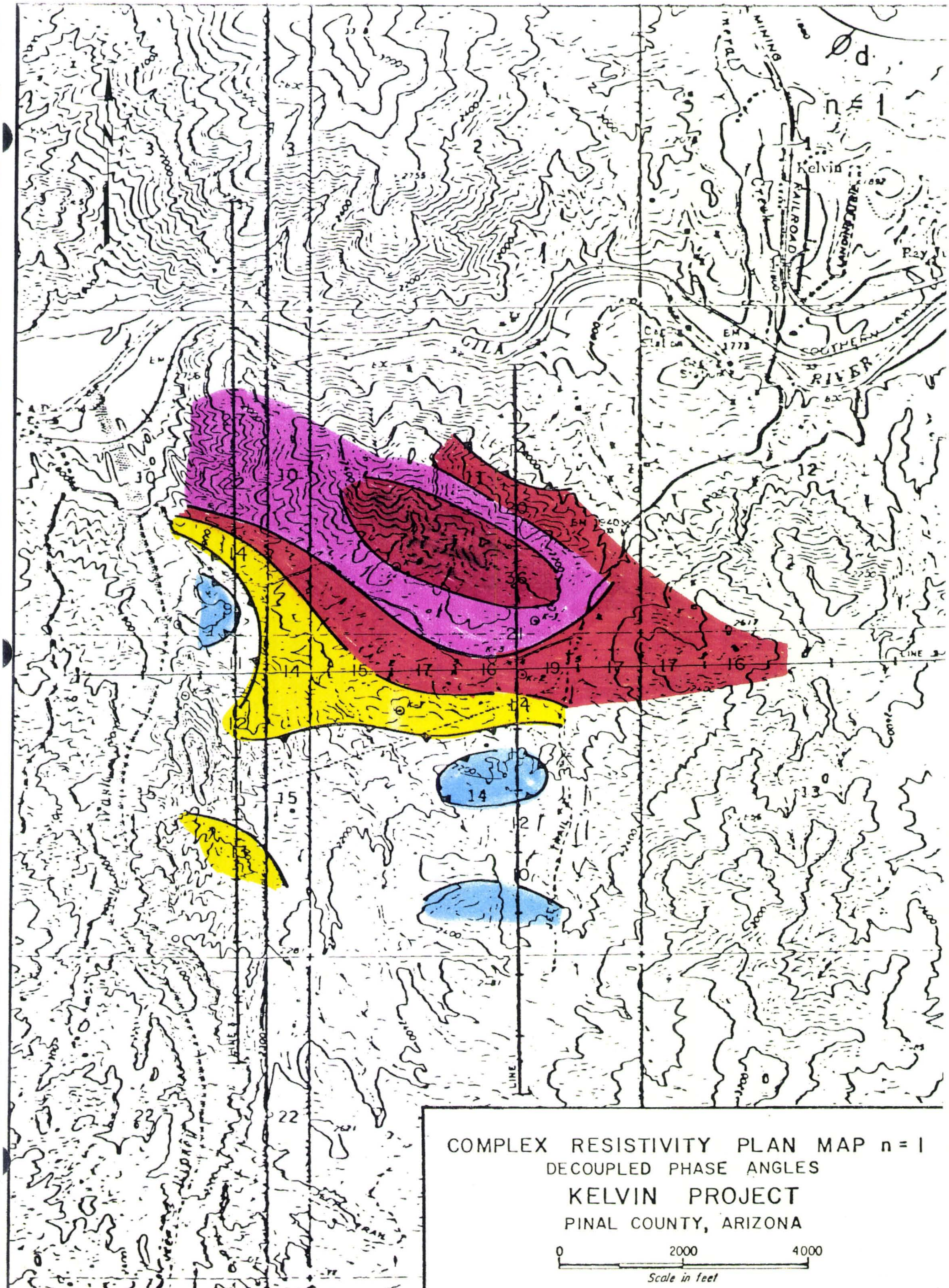


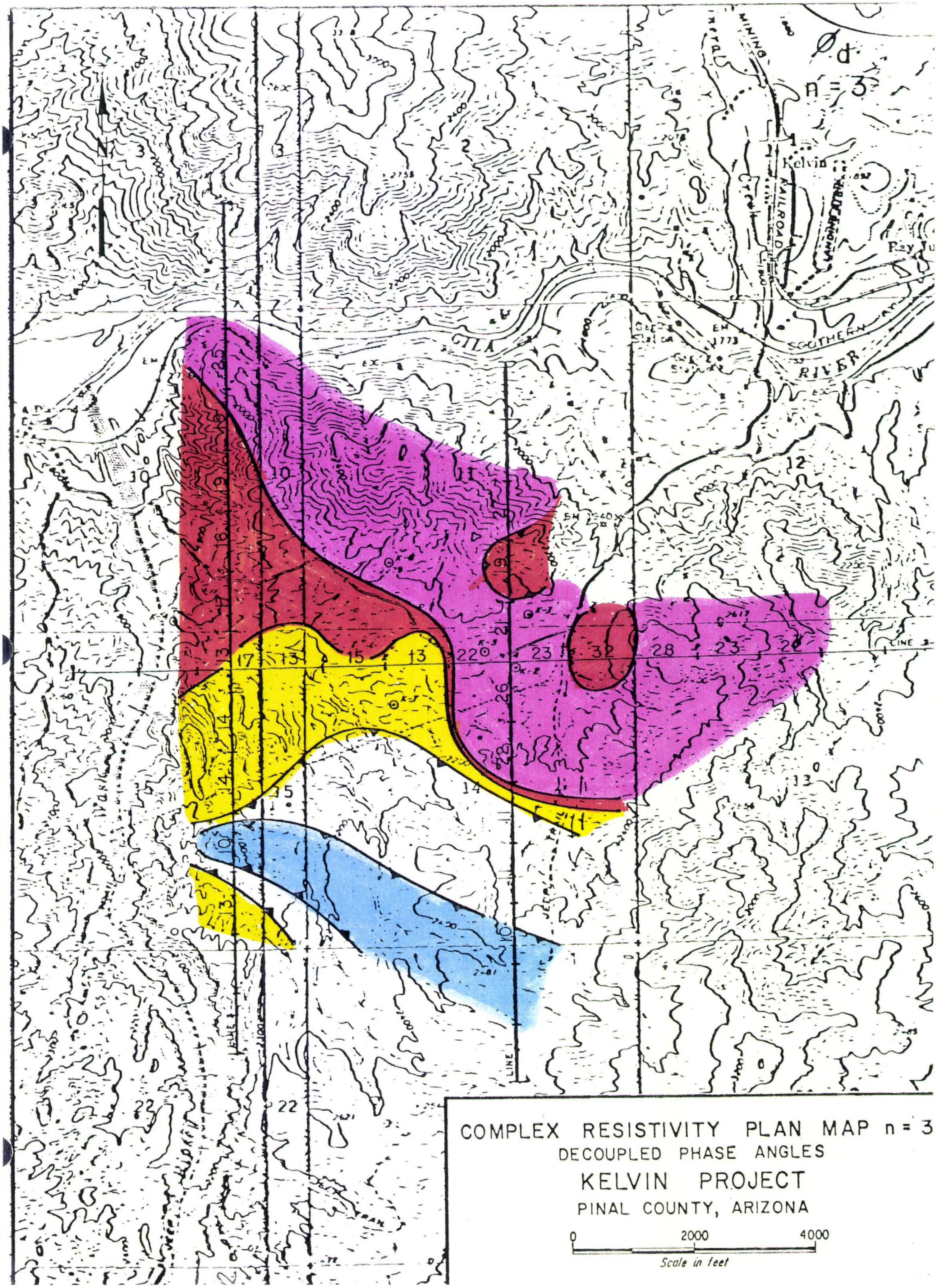
COMPLEX RESISTIVITY PLAN MAP n = 5
RESISTIVITY (ohm meters)

KELVIN PROJECT

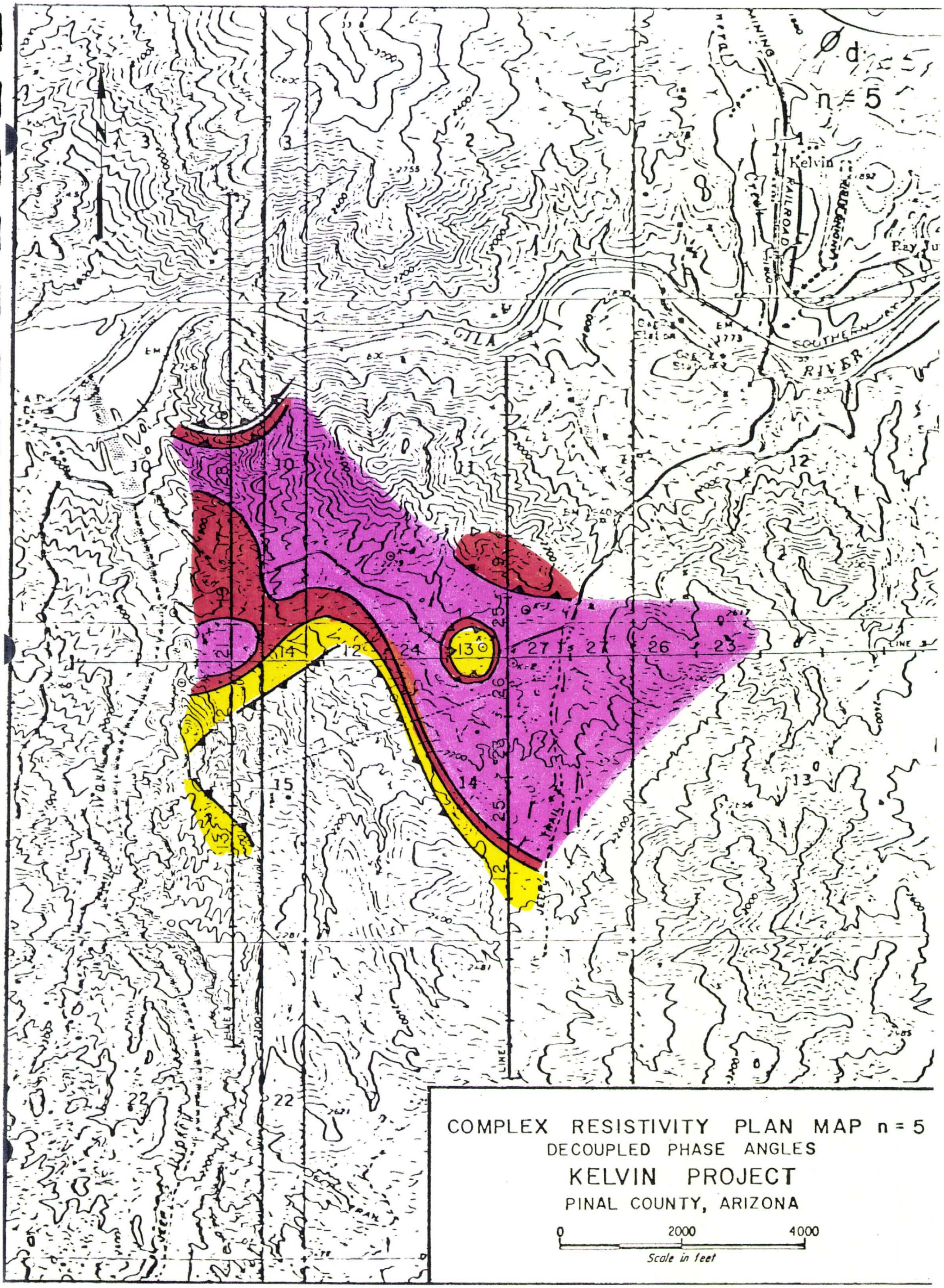
PINAL COUNTY, ARIZONA

0 2000 4000
Scale in feet


Ød
n=1
Kelvin
RAILROAD
GILA
RIVER
SOUTHERN
MINING
LINE
COMPLEX RESISTIVITY PLAN MAP n = 1
DECOUPLED PHASE ANGLES
KELVIN PROJECT
PINAL COUNTY, ARIZONA
0
2000
4000
Scale in feet

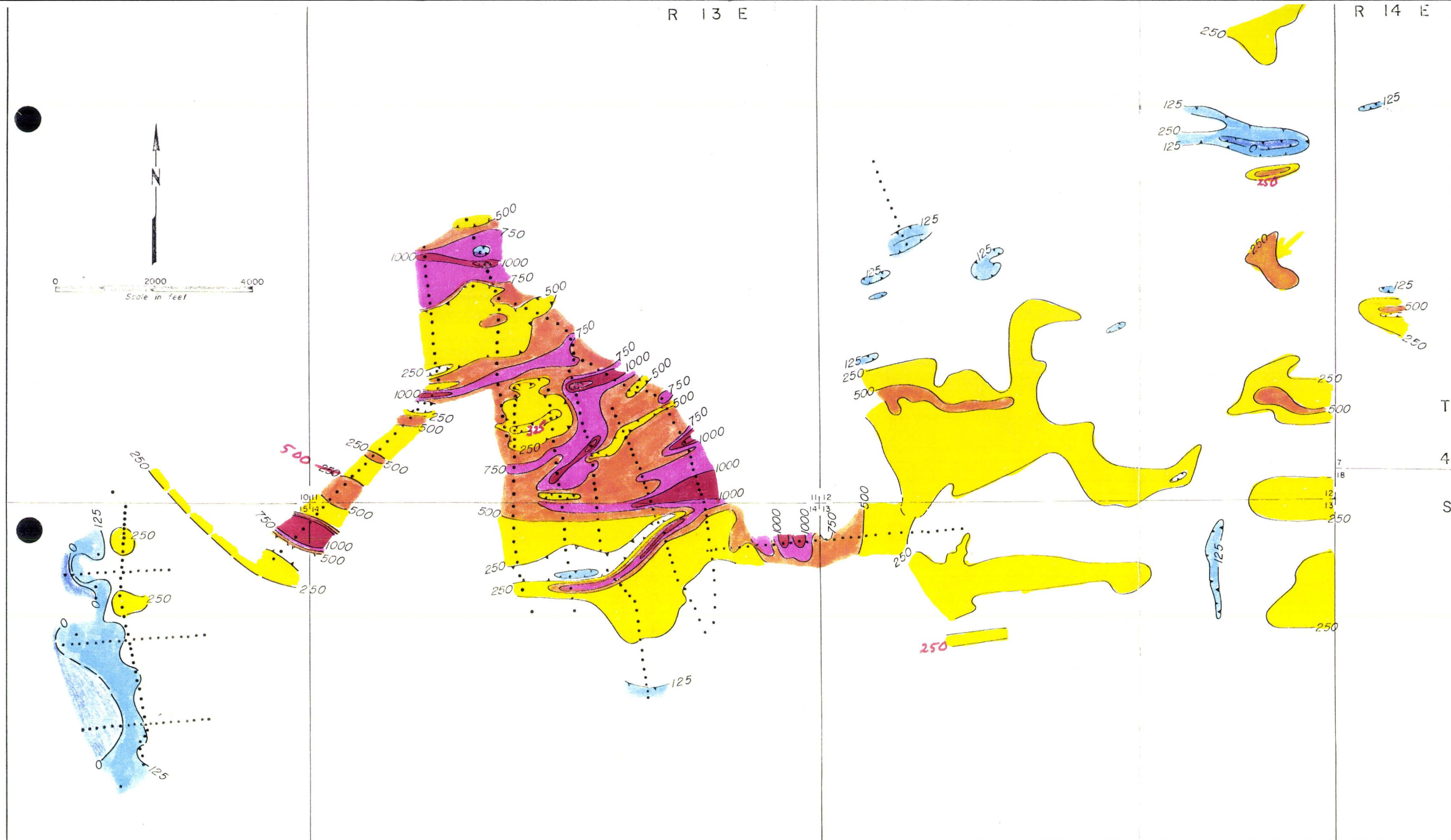


COMPLEX RESISTIVITY PLAN MAP n = 3
DECOUPLED PHASE ANGLES
KELVIN PROJECT
PINAL COUNTY, ARIZONA



COMPLEX RESISTIVITY PLAN MAP n = 5
DECOUPLED PHASE ANGLES
KELVIN PROJECT
PINAL COUNTY, ARIZONA

0 2000 4000
Scale in feet



EXPLANATION

> 1250 Gammas	125-250 Gammas
1000-1250 "	0-125 "
750-1000 "	< 0 "
500-750 "	• Kerr McGee magnetometer station
250-500 "	Contour interval - 250 gammas

Figure 24
GROUND MAGNETOMETER SURVEY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

Gulf Mineral Resources Co.

BY: J Wilkins
DRWN BY: K.A.C.
PROJ. NO. TAO 77-22
DATE: Nov. 1977

TABLE OF CONTENTS

Figures

Figures (cont)

Tables

Appendices

INTRODUCTION

The Riverside (Kelvin) mining district is one of several proven base metal districts in south-central Arizona. The area considered here is immedately south of Ray and covers the northern portion of the Tortilla Mountains, Pinal County (Fig. 1). The principal areas of interest are located in sections 10-14, T4S, R13E and the west half of sections 7 and 8,T4S, R14E. Detailed geologic mapping (Figs. 2 and 3) coupled with district-wide geologic compilations (Fig. 4) and regional structure-tectonic analyses (Fig. 5) demonstrate convincingly that the Riverside district is geologically situated in an area conducive to the localization of high-grade porphyry copper-type mineralization supporting significant byproduct molybdenum. This report will cover the results of GMRC's exploration program to date including geologic mapping, geochemical sampling, alteration-mineralization studies, and a complex resistivity survey. Recommendations for additional exploration are included.

TOPOGRAPHY-VEGETATION-LOGISTICS

The Kelvin area is marked by locally rugged topography (steep slopes and canyons) adjacent to low-relief and gently rolling hills. Elevations range from 1800 feet along the Gila River to 3200 feet above sea level (Fig. 2). Access is good but limited to the less rugged areas. Since the more promising area of alteration-mineralization occurs in the topographically high portions of the prospect, an extensive network of drill roads are required over the more precipitous terrain; fortunately, previous exploration efforts have established portions of this network which will require only nominal cat work.

As shown by Figure 2, it is difficult to find a viable porphyry prospect occupying a more logical setting than at Kelvin-Riverside. Abundant water, power, and rail transportation facilities are present on or immediately adjacent to the property. The entire area is a well established mining subprovince and presently supports a readily available work force at Kearney, Riverside, Superior, and Florence. The ASARCO and Kennecott smelters at Hayden are only 14 miles SSE of the prospect (Fig. 2).

PREVIOUS EXPLORATION SUMMARY

Previous drilling by at least 9 major and minor exploration companies in the Kelvin area aggregate in excess of 23,000 feet. Major companies include Kerr-McGee, Cities Service, Cyprus Mines, Inspiration Consolidated Copper, Occidental Minerals, and Kennecott Copper-Ray Mines Division. A summary of known drilling is given in Table I and the location of each hole is indicated on Figure 6.

Kerr-McGee: The Kerr-McGee effort involved 8 diamond drill holes totalling 9014 feet of drilling (DDH summaries are given in Appendix I). The Kerr-McGee conceptual model of the Kelvin porphyry copper system, Figures 7 and 8,

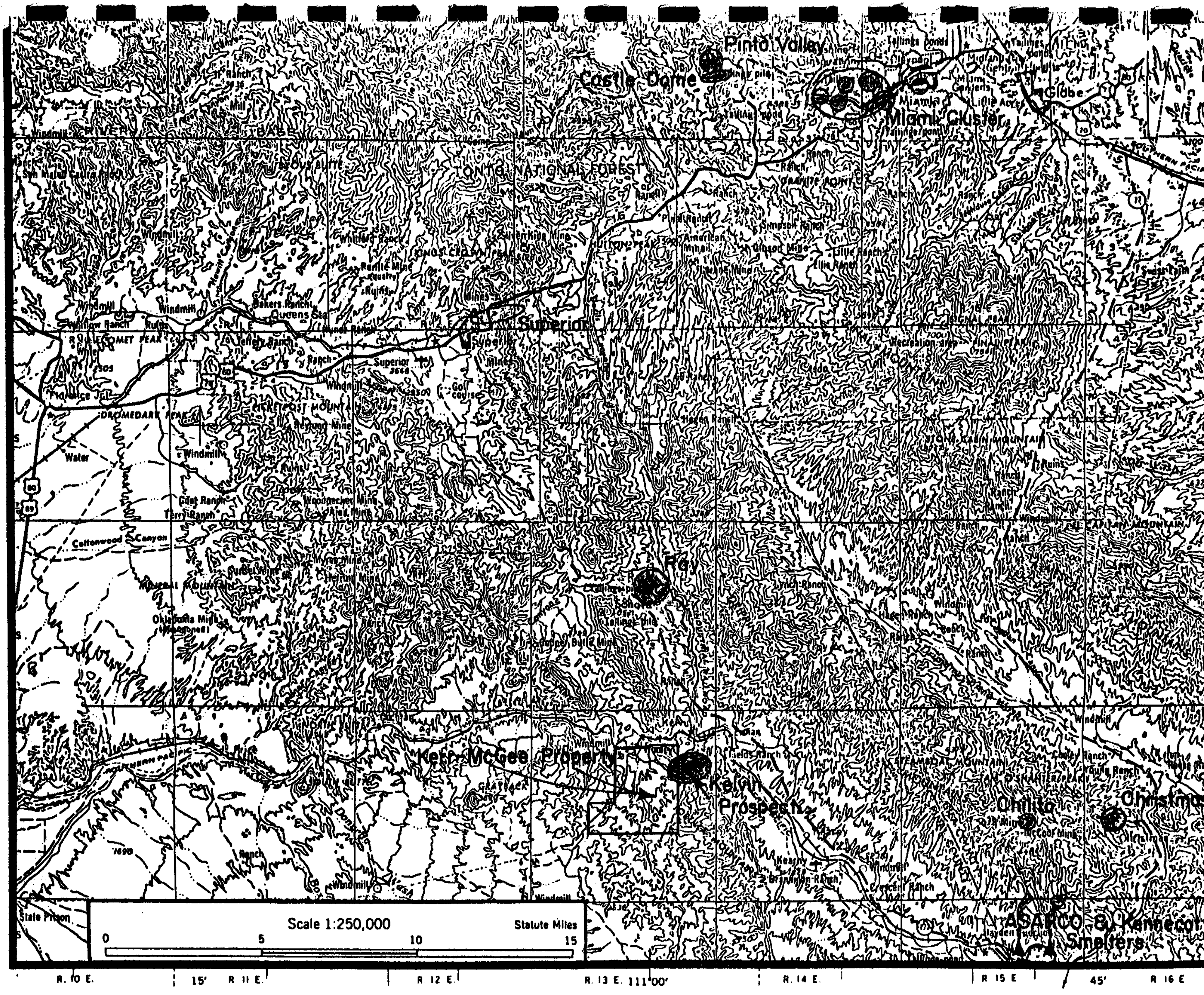


Figure 1. Location map showing the Kelvin prospect, known copper deposits, and smelters.

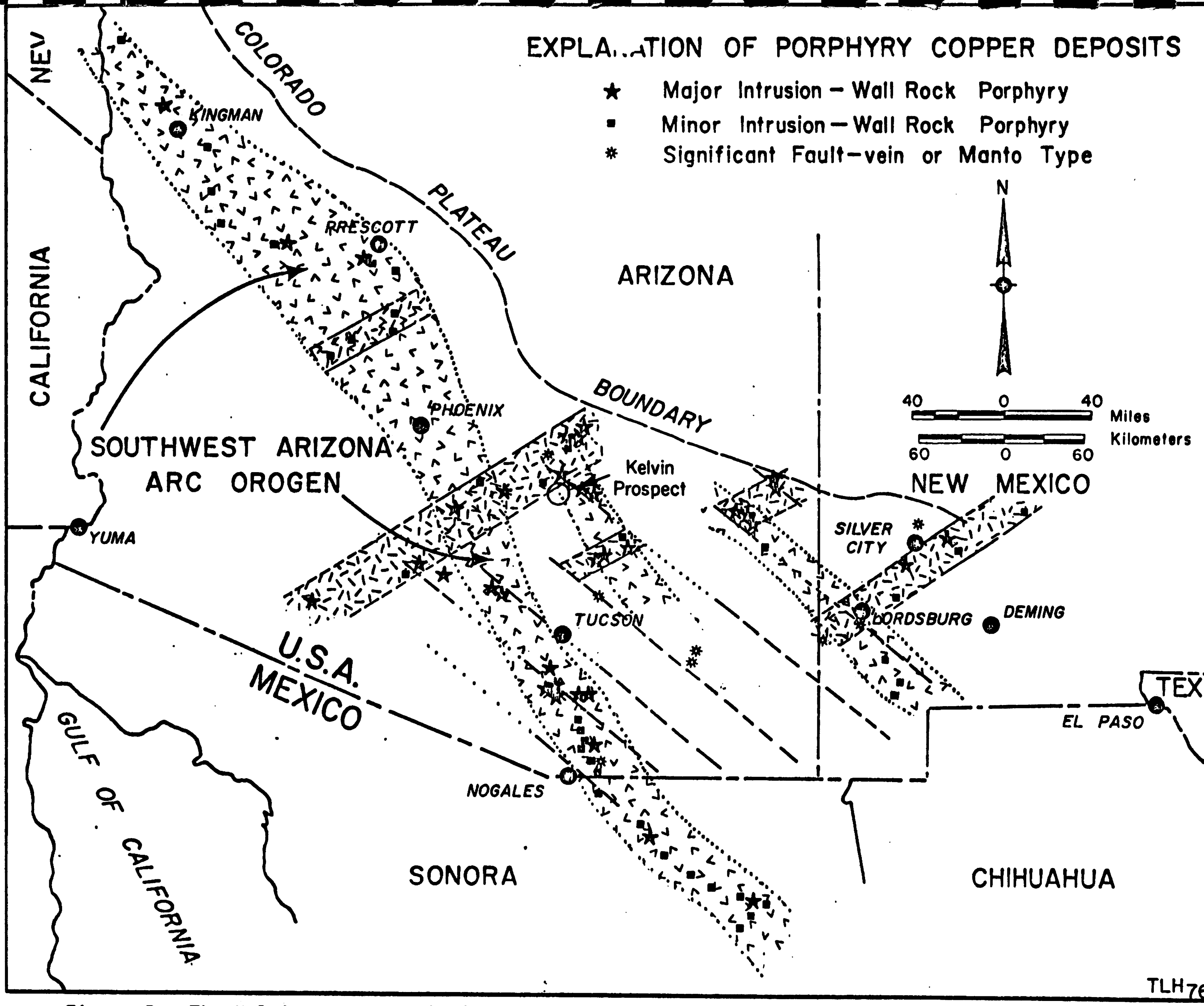


Figure 5. The Kelvin prospect within the Laramide structure-tectonic-volcanic framework along with other known porphyry copper deposits and prospects.

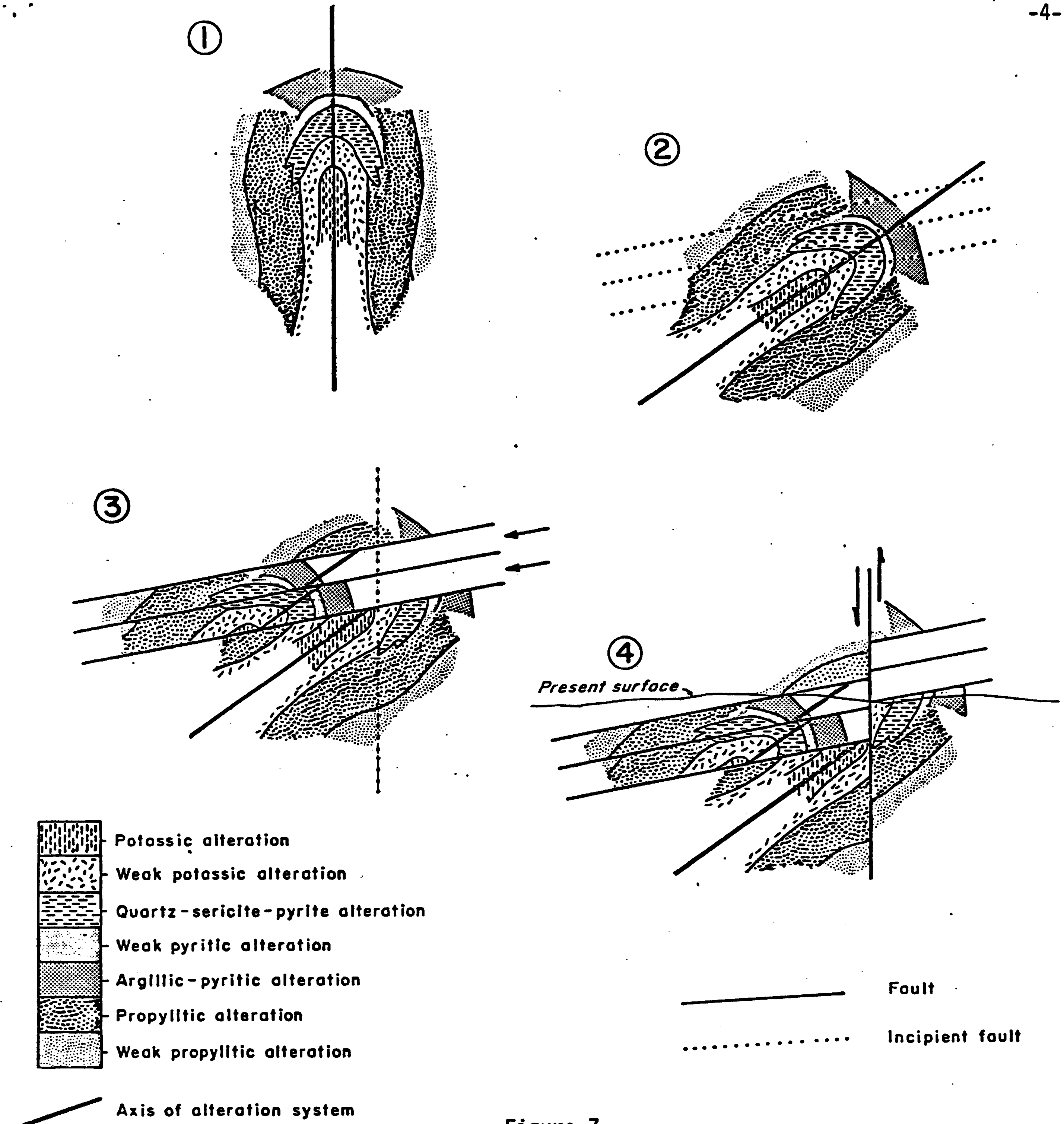


Figure 7

KERR-McGEE CORPORATION

SUGGESTED EFFECTS OF LOW ANGLE FAULTING ON A STRUCTURALLY ROTATED PORPHYRY COPPER ALTERATION SYSTEM

KELVIN AREA

PINAL COUNTY, ARIZONA

R.M. CORN *JULY, 1973*

To accompany: Indicated Low Angle Faults in the Kelvin Area and Recommendations for Additional Geologic Investigation

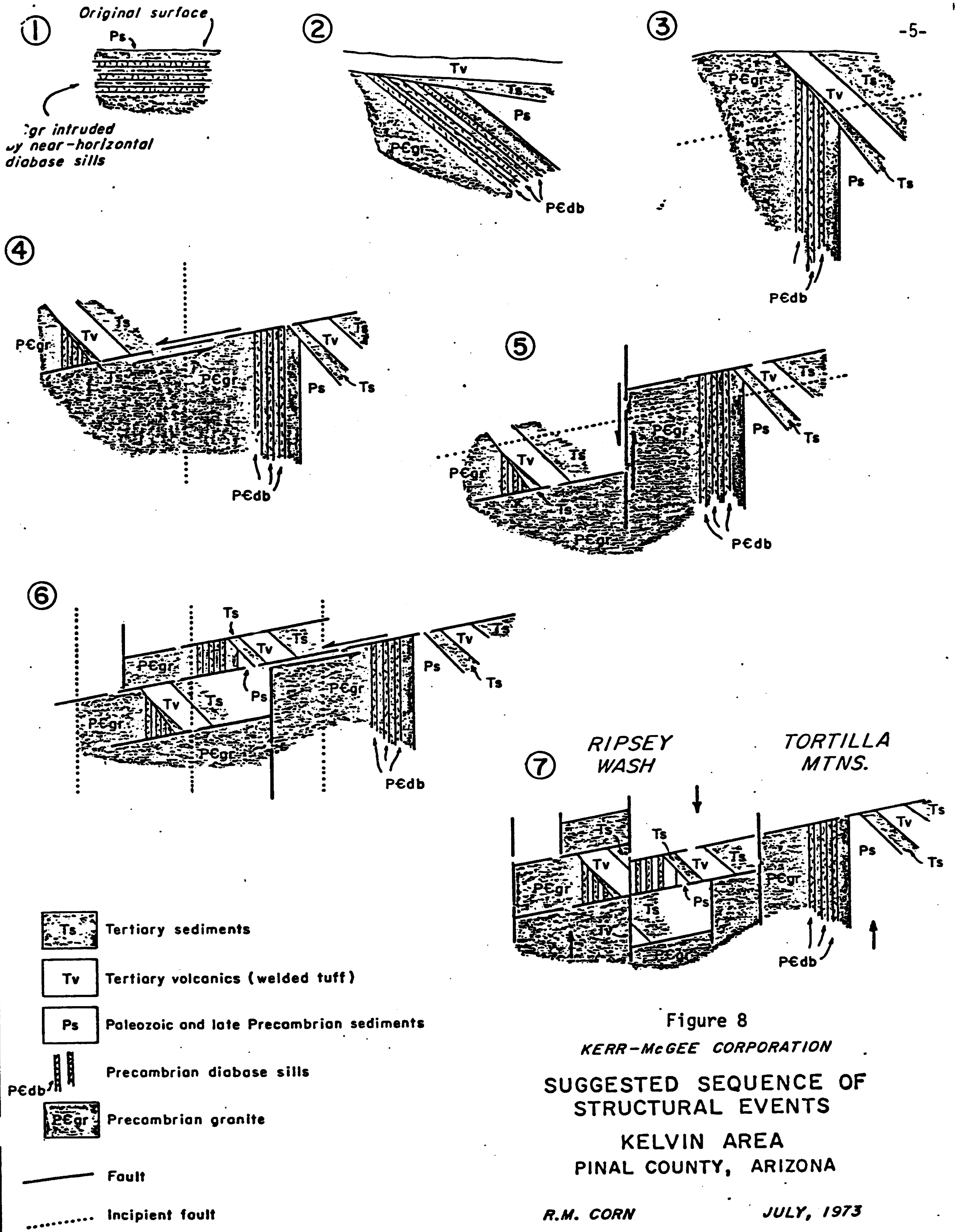


Figure 8

KERR-McGEE CORPORATION

SUGGESTED SEQUENCE OF STRUCTURAL EVENTS

KELVIN AREA

PINAL COUNTY, ARIZONA

R.M. CORN *JULY, 1973*

To accompany: Indicated Low Angle Faults in the Kelvin Area and Recommendations for Additional Geologic Investigatio

TABLE I
DRILL-HOLE SUMMARIES

AREA WEST OF RIPSEY WASH

Hole no.	Attitude	Depth (ft)	Alteration	Average ppm Cu	Best Intercept
Cyprus DDH 1972					
KE-1	60°N	2500'	strong phyllic & strong potassic	360 40ppm Mo	1750-2100' 948 Cu, 51 Mo
Tipperary Land & Exploration RDH 1970					
T-1	vert	1400'	N/A	N/A	N/A
T-2	vert	1635'	"	"	"
Minbanco RDH Pre-1970					
J3	vert	1165	N/A	N/A	N/A
J9	vert	2320'	"	"	"

AREA EAST OF RIPSEY WASH

Hole no.	Attitude	Depth (ft)	Alteration	Average ppm Cu	Best Intercept
Kerr-McGee DDH's 1972-1976					
K-1	vert	1500'	st.phyllic-wk.pot.	890	800-1030',0.26%
K-2	vert	1377'	propy-phyllic	188	775-920', 0.05%
K-3	vert	1386'	propy-phyllic	810	640-790', 0.26%
K-4	vert	875'	propylytic	470	150-190', 0.17%
K-5	vert	1497'	wk.phyllic-propy	130	20-120', 0.05%
K-6	vert	500'	weak propy	44	420-470', 0.01%.
K-7	vert	1077'	weak propy	130	500-505',400ppm
K-8	vert	802'	phyllic-propy	44	686-700',150ppm
Inspiration DH 1966					
ICC-1	vert	400±'	N/A	N/A	N/A
ICC-2	vert	unk.-validation	"	"	"
Occidental Minerals DDH's 1967-1968					
OX-1	60°S	415'	N/A	N/A	N/A
OX-2	60°S25°E	500'	"	"	"
OX-3	60°S	396'	"	"	"
OX-4	60°S5°E	500'(unk)	"	"	"
Pre-Occidental CDH's 1949					
CDH-1	vert	520'	N/A	N/A	N/A
CDH-3	vert	735'	"	"	"
CDH-6	vert	457'	"	"	"
CDH-8	vert	352'	"	"	"

TOTAL FOOTAGE DRILLED

Cyprus-Tipperary-Minbanco	8020 ft.
Kerr-McGee	9014 ft.
Inspiration	400 ft.
Occidental	1811 ft.
1949 CDH's	2064 ft.
Total known Kelvin	22309 ft.

was a 4-event model that became progressively complicated with each additional drill hole. The model was based upon the following sequence of events:

1. Vertical emplacement of a porphyry copper system of the Red Mountain type.
2. Post-emplacement rotation to a sub-horizontal position.
3. Low-angle faulting, with the top of the system moving to the west.
4. High-angle faulting with a strong lateral componet offsetting and down-dropping portions of the deposit to the east.
5. Erosion to the present surface.

Following completion of drill holes K-1 through K-3 (1972-1973), a second episode of low angle faulting and normal faulting was added to the working model. The basic reasoning behind this interpretation is quite sound since the Tortilla range is suspected as one of the many rotated mountain ranges in Arizona's Basin and Range Province. However, in the Kelvin area the axis of rotational faulting appears to have been to the west of the main Kelvin area. Drill log summaries for holes K-1 through K-8 are included in Appendix I.

Cyprus-Tipperary-Minbanco: The drilling west of Ripsey Wash in the Johnson area, now under option to Cities Service, lends credence to Kerr-McGee's interpretation. Here the exposed rocks are an allochthonous block of propylytically altered Ruin granite, intruded by the Tea Cup granodiorite (62.9 and 61.4 m.y., Cornwall and Krieger, 1975) and several quartz latite porphyry and rhyodacite porphyry dikes. This sequence is partially overlain by steeply tilted Whitetail conglomerate (32 m.y., Cornwall and others, 1971) and conglomerate and tuffs of the San Manuel formation (17 m.y. to 24 m.y., Cornwall and Krieger, 1975).

The drilling to date totals 8,020 feet including a 2,500 foot hole and a 2,320 foot hole. In addition, Cities Service has completed a number of holes with unknown results. Our interpretation of the geology of this area suggests that Ripsey Wash marks the trace of a large low-angle fault and the area to the west is an allochthonous block of a propylytically altered portion of another porphyry copper system.

Occidental: Occidental Minerals drilled 4, possibly 5 drill holes totalling 1811 feet with the deepest hole 500 feet deep. The OXY program, instigated by Mr. Bob Holt (of Holt, Inc.) was designed to test a shallow chalcocite blanket play in sections 12 and 13 (Fig. 2). According to Mr. Will Chester, Project Geologist for Occidental in 1967-68, the program was partially successful but a "low-angle fault" was encountered at the base of the "thin" chalcocite blanket and inadequate reserves were indicated to justify additional exploration.

During the current mapping program, an intensive search was made in order to locate these postulated low-angle faults. The trace of the chalcocite blanket was found but there was no evidence of any movement along its base. Instead, a thick alteration zone composed of supergene argillization was encountered that could have been interpreted as fault gouge in a drill hole.

Pre-Occidental and Inspiration: Pre-OXY drilling consists of 4 churn drill holes totalling 2,064 feet. The holes were probably drilled by Kennecott Copper Corporation-Ray Mines Division. This effort was directed at delineating a chalcocite blanket and probably encountered results similiar to Occidental's. The Inspiration drilling consisted of two shallow validation holes spotted to test shallow IP anomalies.

Other Drilling: Kennecott Copper-Ray Mines Division is still active in the area as indicated by drill hole KCC-1012, completed to 1,850 feet in 1977 in the NE¼ section 14 (Fig. 6). Three additional holes of unknown origin were encountered in the map area but all lie within peripheral alteration-mineralization and appear to extend to limited depths.

LAND STATUS

There are 6 major mining claim groups (patented and unpatented) in the Kelvin portion of the Riverside district. The approximate locations of each major group is shown in Figure 6. Exploration companies actively involved in each area are Kerr-McGee-GMRC, Kennecott Copper Corporation (Ray Mines Division), and Cities Service. Individuals holding large blocks of claims include M.S. and Lucy Wilkins, Ronald R. Deen, and James Gaylor.

GMRC-Kerr-McGee: The current GMRC-Kerr-McGee joint venture negotiations include Keri 1-99, the Rip 1-72 claims staked by Kerr-McGee and the 13 Ruby Marlene claims optioned from R.R. Deen by Kerr-McGee. Also included in this potential joint venture agreement is the state prospecting permit covering most of section 10.

Cities Service: Cities Service Exploration has 4-5 square miles of claims and state prospecting permits (section 16) under option immediately west of the Kerr-McGee-GMRC ground. The precise configuration and location of Cities' holdings are not known but their eastern claim lines and the Kerr-McGee-GMRC western claim lines appear to be a common boundary.

Kennecott Copper Corporation: Kennecott maintains 2 unpatented claim groups (River 1-27 and Erman 1-31) and several patented claims, millsites, and townsites in the northeast quadrant of the Kelvin area (Fig. 6). The River group is situated in section 13 and overstakes the Ruby Marlene claims (the location of each River and Erman claim is given in Appendix IIa). The Erman group straddles the Gila River and in part, covers the patented surface ground held by Kennecott. Kennecott's patented ground in sections 1, 6, and 7 is fairly extensive and includes: 1) 18 millsites (62 acres), the Kelvin townsite, and 400 acres of surface (but not minerals) in the east half of section 7; 2) 351 acres of surface plus minerals in the west ½ of section 1; and 3) most of section 6.

M.S. and Lucy Wilkins: A large block of 27 patented mining claims and one patented millsite totalling 523 acres is owned by Mr. M.S. and Lucy

Wilkins of Morgan, Texas (no known relation to Joe Wilkins). These claims were optioned to Occidental in 1967 but subsequently released and are currently available for option or purchase.

Deen Claims: The following claim groups are apparently valid claims in the Riverside district held by Mr. Ronald R. Deen:

Ruby Marlene gp.	13 claims	Optioned by Kerr-McGee
Rosa Lee	8 claims	Sec. 18 and fractions in Wilkins gp
Riverside	4 claims	Sec. 6, KCC patented surface
Hidden Treasure	4 claims	Cities Service area

The Ruby Marlenes are located on Figure 6, but the location descriptions of the Rosa Lee and Riversides, given in Appendix IIb are vague and not amenable to accurate plotting.

Gaylor Claims: Assessment work was filed by a Mr. John Gaylor, Universal Copper Company, Tucson, Arizona to cover 72 claims in the Riverside mining district (see Appendix IIc). The exact locations of these claims is not known but we believe that they are situated in the Troy area. However, there is a possibility that some of these claims are located in the north ½ of section 11 and the NW ¼ of section 12.

Other Deeded Lands: About 80 acres of deeded land is present in section 1 in the town of Kelvin that has been partially subdivided. Each parcel within this zone ranges in size from 1 to 40 acres each with a different ownership.

Other Mining Claims: Assessment work for 1977 was filed for the following claims in the Riverside district:

Dan claims	by Albert Smith
Sun Goddess	by Laberta Estes
Tipperary 1-13	by J.P. Vromar

The locations of each claims is not known but the Tipperary group is believed situated in the Cities Service area.

GENERAL GEOLOGY AND STRATIGRAPHY

Broader aspects of the geology, stratigraphy, and structure surrounding the Kelvin prospect are provided by our compilation of available data from the Granite Mountain, Sonora, Winkelman, and Grayback Mountain quadrangles (Fig. 4). Rocks in the general area vary in age from Precambrian to Holocene. Figure 9 is a generalized composite columnar section outlining the stratigraphic succession drawn from published data on the Tortilla and Dripping Spring Mountains.

The oldest rocks in the area covered by the larger scale index map (Fig. 4) include the Pinal schist of Precambrian X age and intrusive rocks,

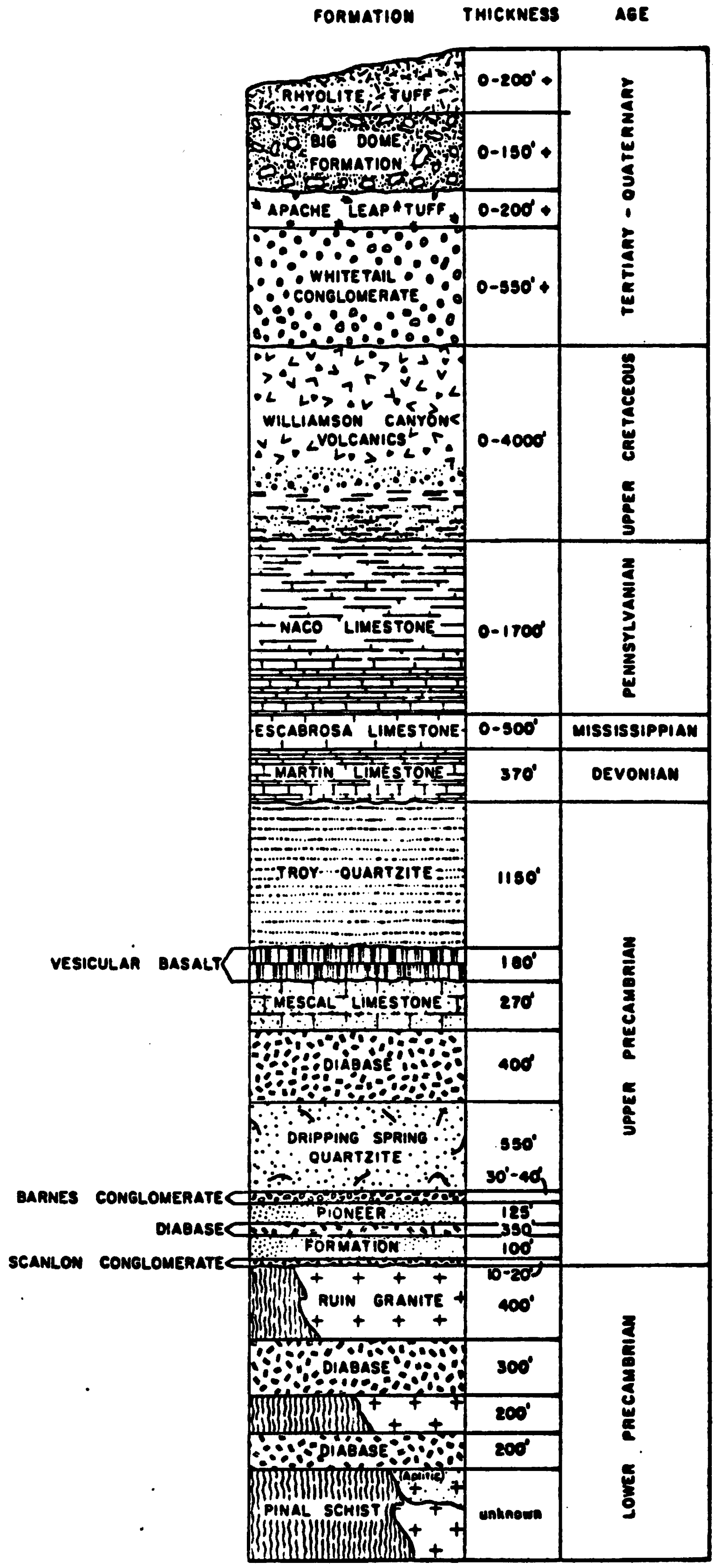


Figure 9. Composite columnar section of the Tortilla and Dripping Spring Mountains.

largely Ruin granite (Oracle granite equivalent) or its aplitic facies, of early Precambrian Y age (Figs. 2 and 3). Batholithic masses of Ruin granite (1,430 m.y.) were intruded after a period of intense deformation which produced subvertical east-trending foliation and bedding in the schist.

This older Precambrian basement is cut by a profound angular unconformity and overlain by Apache Group sedimentary and metasedimentary rocks of Precambrian Y age. Formations involved include the Scanlan conglomerate, Pioneer formation, Dripping Spring quartzite, Mescal limestone, a vesicular basalt unit, and the disconformably overlying Troy quartzite. Figure 9 summarizes this stratigraphic succession, generalizes pertinent lithologic characteristics, and gives the corresponding thickness of each respective rock unit.

Abundant Precambrian diabase dating 1,200 m.y.BP forms sills within the Apache Group and Troy quartzite (Fig. 9). Sill-like masses of diabase are also noted cutting the underlying Pinal schist and Ruin granite on a regional basis (Fig. 4). In general these masses are distributed paraconformably to the pre-Apache angular unconformity. This distribution coupled with the fact that these sill-like intrusions are rarely if ever found more than 500 feet below the unconformity, suggest to us that they were emplaced along subhorizontal exfoliation surfaces oriented sympathetic to the Precambrian Y erosion surface.

Following a long period of erosion, no more than 2,500 feet of Paleozoic strata were deposited paraconformably on the Precambrian sedimentary rocks and diabase (Fig. 9). Paleozoic units suspected as having once overlain the Kelvin prospect include limestone of the Martin, Escabrosa, and Naco formations. As shown by our regional compilation (Fig. 4) and corresponding cross section A"-A"', Paleozoic and older rocks in the Dripping Spring Mountains (northeastern portion of the index map) are gently to moderately dipping except along selected high-angle normal faults. In contrast, comparable strata west of the Gila River flood plain and south of the prospect area, crop out in N-striking vertically dipping linear belts overlying Precambrian basement.

Up to 4,000 feet of volcanic rocks of Late Cretaceous age disconformably overlie older rocks in the Dripping Spring Mountains (Willden, 1964). Andesitic flows and rhyodacitic-quartz latitic pyroclastic units cropping out in the Kearney quadrangle southwest of Kearney are considered correlative to the Williamson Canyon and Glory Hole volcanics respectively (Fig. 4). These volcanics are viewed here as extrusive equivalents of the Laramide intrusions noted prevading much of the Tortilla and Dripping Spring Mountains.

As generalized on the regional index map (Fig. 4) and detailed on our Kelvin geologic map (Fig. 2), Laramide intrusions include: 1) numerous large to small plutons of diorite, quartz diorite, granodiorite, and quartz monzonite, 2) small apophyses and comagmatic dike swarms of andesite, dacite, and rhyodacite, and 3) occasional pipes of intrusion breccia such as the one mapped immediately south of Riverside (Fig. 2). K-Ar data on these Laramide porphyries from the mapped and immediately surrounding area fall between a maximum of 74 and a minimum of 59 m.y.BP. Hydrothermal alteration believed coeval to the dominant period of Cu-metallization at Ray and Christmas is placed at 65 and 62 m.y.BP respectively.

The oldest known Tertiary sedimentary deposit in the area is the Whitetail conglomerate. Pebbles, conglomerates, and boulders of Precambrian, Paleozoic, and Laramide ages, were laid down in local structural basins, and contain interbeds of tuff which date 32 m.y.BP (Oligocene). Overlying the Whitetail are several Tertiary units formerly assigned to the Gila conglomerate, which now include three formations: San Manuel (early Miocene), Big Dome (late Miocene), and Quiburis (Pliocene) as described by Krieger (1974). The moderately deformed San Manuel formation consists of alluvial, lacustrine, and playa deposits, the gently deformed Big Dome formation is alluvial, and the undeformed Quiburis formation consists of lake bed and alluvial facies. For simplicity and ease of compilation, sediments of the Big Dome and Quiburis were grouped into a single unit on Figures 2 and 4.

Quaternary accumulations composed of cobble, pebble, sand, and silt occur on pediments, flood plains, steep talus slopes, and fill stream channels throughout the mapped area. For convenience, these assorted deposits were not subdivided.

STRUCTURE-TECTONICS

Clusters of porphyry copper deposits often lie at or adjacent to the intersection of two or more premineral-intermineral regional tectonic elements. As indicated on Figure 5, the Kelvin-Ray area constitutes one such setting in that it occupies a common intersection formed by the following elements:

1. The NW projection of the N55°W trending Dos Cabezas-Ray discontinuity.
2. The ENE-trending porphyry break extending through Ajo, Casa Crande, Florence, and Ray.
3. An en echelon volcanic arc of NNW trend sympathetic to the probable crest of the Laramide arc orogen of southwest Arizona.

It is not surprising then that these are the three directions mimicked in great detail by lower order elements mapped on Figures 2 and 4 including folds, faults, dike-vein swarms, and elongate aureoles of primary alteration-mineralization.

Tortilla Mountains Monocline: One major and structurally significant element delineated by the 1:62,500 compilation is the N to NNW-trending en echelon set of steeply dipping, overturned, or overturned-overturned ridges of metasedimentary (Yms), diabasic, and Paleozoic sedimentary rocks. The tops of beds forming these upright ridges invariably face east and are interpreted as partly denuded roots of a single monoclinal fold traceable throughout the length of the Tortilla Mountains and beyond to a point NW of Ray. As indicated on Figure 4, the steeply dipping east-facing monoclinal flexure is locally offset by NE to E-trending strike-slip faults or repeated by low-angle gravity slide (dècollement) surfaces (i.e., Ripsey Wash zone). Locally the stratigraphic succession within an individual ridge is repeated along high-angle faults striking sympathetic to the monoclinal axis (Cf. Sec. A"-A"', Riverside Monocline area). Krieger (1974) interpreted these high-angle normal faults as having formed as low-angle west-dipping thrust faults which were subsequently tilted during the development of the monocline to their present nearly vertical position.

Reconnaissance mapping throughout the Tortilla Mountains and detailed studies in the Kelvin area show the monocline as having formed after the Williamson volcanic (75-80 m.y.) eruptions but for the most part prior to the emplacement of numerous 72-59 m.y. plutons, porphyry dike swarms, and the Riverside breccia pipe. Although folding adjacent to the monocline continued during and after deposition of the Miocene San Manuel formation (Fig. 4, A"-A"'), we view this tilting as largely drag-related along the boundary separating the uplifted Tortilla Mountains block from the subsiding graben blocks forming the San Pedro rift.

Elongate Plutons, Dike Swarms, and Fault-Veins: Our regional structure-tectonic synthesis of Laramide volcanism, plutonism, and metallization in the American Southwest demonstrates that most major porphyry copper deposits lie along ENE-trending porphyry breaks. Several of the better documented belts are indicated on Figure 4. Evidence of this regional structural control is present on every scale of geologic mapping in the Kelvin-Ray-Tortilla Mountains area.

On the 1:62,500 scale map (Fig. 4), this grain is particularly apparent as evidenced by the numerous: 1) elongate plutons and apophyses of diorite, quartz diorite (71 m.y.), quartz monzonite (68 m.y.), and granodiorite (66 and 62 m.y.); 2) comagmatic porphyry dikes including dacite (71 m.y.), an assortment of rhyodacite (66 m.y.), quartz monzonite (63 m.y.), latite, aplite, and hornblende andesite; and 3) coeval sets of subvertical veins and fault-veins containing quartz, specularite, magnetite, chlorite, epidote, tourmaline, chryscolla, calcite with or without propylytic-phyllic alteration selvages. The inset strike rosette shown on Figure 2 summarizes the overall trend of 601 Laramide mesoscopic elements mapped throughout the Tortilla Mountains - including the Kelvin prospect. This rosette was constructed using 1000 ft. strike segments, averaging the bearing of each segment, grouping each segment into 10^{o} class intervals, and plotting on a standard percentage strike frequency rosette. The marked preference of subvertical to vertical Laramide structures to strike E-W to ENE is quite apparent. Identical distributions are revealed by rosettes constructed using comparable data from the areas surrounding the Ray and Christmas porphyry copper deposits.

Smaller scale elements including individual mineralized joint sets, veinlets, and dikelets within these productive systems also mirror the more regional control. This is the case at Kelvin-Riverside in that our detailed mapping (Fig. 2) reveals a marked preference for most small-scale high-angle mineralized structures, dikes, and intrusion breccia masses to strike ENE sympathetic to the porphyry breaks delineated on Figure 5. The marked influence of this penetrative structural grain and its control over the distribution of hydrothermal fluid flow is particularly evident in the geochemical dispersion and alteration maps of the Kelvin area as discussed later.

Previous work in numerous districts throughout the American Southwest demonstrates convincingly that most of the ENE-trending Laramide structure is regional tectonic in origin (Rehrig and Heidrick, 1972); however, the obvious enhancement in frequency of ENE-striking elements eastward across the Florence highlands and in particular as one crosses the hinge of the Tortilla monocline (Fig. 4) is no mere coincidence. This spatial congruency is suggestive of a cause and effect dependency between monoclinal flexuring and local wholesale N-NNW-directed extension. And since most SW porphyry systems occupy settings showing significant extensional tectonism, this indirectly provides us with some much needed insight concerning the regional control of ore localization at Ray; particularly, since to our knowledge no one has yet mentioned the possibility that Ray lies along or straddles the hinge of a Laramide monocline of regional porportions. This appears as an inescapable consequence of the regional tectonic overview provided by Figure 4.

Postmineral Gravity (Normal) Faults: Gravity induced tectonism runs rampant throughout the Basin and Range province of the western United States and the Kelvin-Ray area is no exception. Two styles of gravity (normal) faults are recognized in the mapped area and include: 1) relatively high-angle N-NW-striking faults associated with the blocking-out and rifting along the San Pedro drainage (Fig. 4), and 2) low-angle, depth flattening, N-NNW-striking faults associated with westward-directed gravity sliding away from the hinge of the Tortilla monocline (Fig. 2, Sec. A-A', B-B').

Rifting accompanied by subsidence along the composite San Pedro graben system commenced during Oligocene time, accelerated during the Miocene (San Manuel and Big Dome formations), and persisted through the Pliocene (Quiburis formation). East of Riverside, available regional gravity data suggest a minimum of 9,000 feet of Late Tertiary conglomerate, sedimentary breccia, megaslide blocks, sand and silt within the San Pedro graben system. Blocking out of this N-NNW-trending catchment basin was facilitated and probably controlled in large part by the upright limb of the NNW-trending Tortilla monocline (Fig. 4). Termination of the rift on the north appears coincident with the projected trace of the N55^{O}W trending Dos Cabezas discontinuity shown schematically on Figure 5, and mimicked in more detail by the regional geology on Figure 4.

In the Kelvin-Ray-Tortilla Mountains, gravity slides (décollement or detachments) occur as concave-upward (cycloidal) surfaces. They separate younger metasedimentary and sedimentary hangingwall rocks from older Precambrian footwall terrains (Figs. 2 and 3). The Ripsey Wash décollement is believed representative in that: 1) detached young hangingwall sediments dip moderately in the opposite direction from the glide surface, 2) imbricate shingling across the entire zone produces dip separations totalling several thousands of feet (Fig. 3, A-A'), 3) dips of younger sedimentary units steepen progressively within higher cycloidal slices, and 4) numerous N-NNW-trending antithetic normal faults were activated after the Ripsey Wash décollement was emplaced. Details concerning the orientation of the transport vector (dip-slip) for these slides remain enigmatic but work continues in this regard.

ORE DEPOSITS

Subvertical ENE-trending quartz-pyrite veins and veinlets containing anomalous Cu, Mo, Pb, Ag, and Au associated with sericite, chlorite, magnetite, specularite, epidote, tourmaline, and/or calcite transect Ruin granite, diabase sills, Laramide dikes, and are associated with intrusive and crackle breccias along the axis of the N-trending, east facing, Riverside monocline. The southeastern edge of the mineralized area is inturn cut by a complex décollement involving mineralized Ruin granite, diabase, Tortilla quartz diorite, and Gila conglomerate (see Figs. 2 and 3 for details). Axial faults, cataclastic deformation of the Ruin and diabase, and the variable attitudes of the diabase sills define the axis of the monocline.

Mineralization

Mineralization is confined to the ENE to ESE-trending veins, veinlets, and coated joints but is often sparsely disseminated throughout the alteration selvages surrounding the mineralized joints. The strongest and most persistent mineralization occurs along vein and veinlet swarms (up to 80 veinlets per 10 foot traverse) at the boundary between sections 12 and 13 and south of the intramineral Diamond Hill fault. A thin discontinuous chalcocite blanket that was developed in post-décollement time is present in this area. On the outer margins of the strong mineralized zone (at Sultana-Arizona and adjacent to Ripsey Wash) mineralization is confined to relatively thick throughgoing veins containing pyrite, chalcopyrite, galena, and molybdenite or their oxidized products. Although mineralization appears to transect lithologic boundaries, the diabase appears to be a chemical and physical barrier to the migration of the hydrothermal solution and copper appears to be more highly concentrated in diabase units.

Alteration

The area of intense alteration is centrosymmetric to the area of strongest mineralization, concentrically zoned, elongate ENE-WSW, and grades from intense phyllic outward to a mixed phyllic and propylytic zone into strong to weak propylytic alteration. The limit of each zone is outlined on Figure 10.

The area of pervasive phyllic alteration is recognized by thorough wall-rock sericitization-silicification and appears spatially restricted to areas of strong pyritization. Within the phyllic zone the iron phases are pyrite and/or magnetite (common in diabase units) and all feldspars and mafic silicates are replaced by sericite - except in the diabase where chlorite is a stable phase.

The mixed phyllic-propylytic alteration zone surrounds the phyllic zone and is defined by coexisting sericite and chlorite - with or without epidote or tourmaline but not both. Stable iron phases are pyrite, magnetite, and specularite.

The propylytic alteration zone is widespread, decreases gradually outward from the phyllic center, and is defined by coexisting epidote and tourmaline with calcite and chalcedonic quartz veins. Specularite and pyrite are the prevalent iron phases.

Geochemistry

One hundred thirty two rock-chip samples of vein, veinlet, mineralized dikes and breccias and their alteration selvages were collected from the mapped area and analyzed for Cu, Mo, Pb, Au, and Ag. These are routinely the least mobile metals occurring in an oxidized porphyry copper environment. Vein sampling was deemed necessary because 95% of the mineralization at Kelvin is confined to these structures and their respective alteration selvages.

The geochemical analysis were plotted as histograms (see Fig. 11) and a background concentration established for each metal. As shown on the histogram, the distribution peaks for each metal is semi-logarithmic and these peaks provide the basis for the contour intervals used on each geochemical distribution map. The data for each metal were plotted in plan (Figs. 12, 13, 14, and 17) and contoured using the previously established contour interval.

Copper: Above-background Cu values ranging from 300ppm to 10% are correlative with the phyllic and mixed phyllic-propylytic alteration zone (Fig. 12) and with diabasic units - especially in the Sultana-Arizona area - again illustrating the strong lithologic control over copper deposition exerted by the diabase.

Molybdenum: Anomalous Mo values ranging from 20 to 100ppm are concentrated within the phyllic zone (Fig. 13), associated with copper mineralization at Sultana-Arizona, in the crackle breccia to the south, and along an ENE-trending vein system to the north. The moly zone is strongly aligned ENE parallel to the strike of the strong mineralization structures and highest in the area of pervasive phyllic alteration.

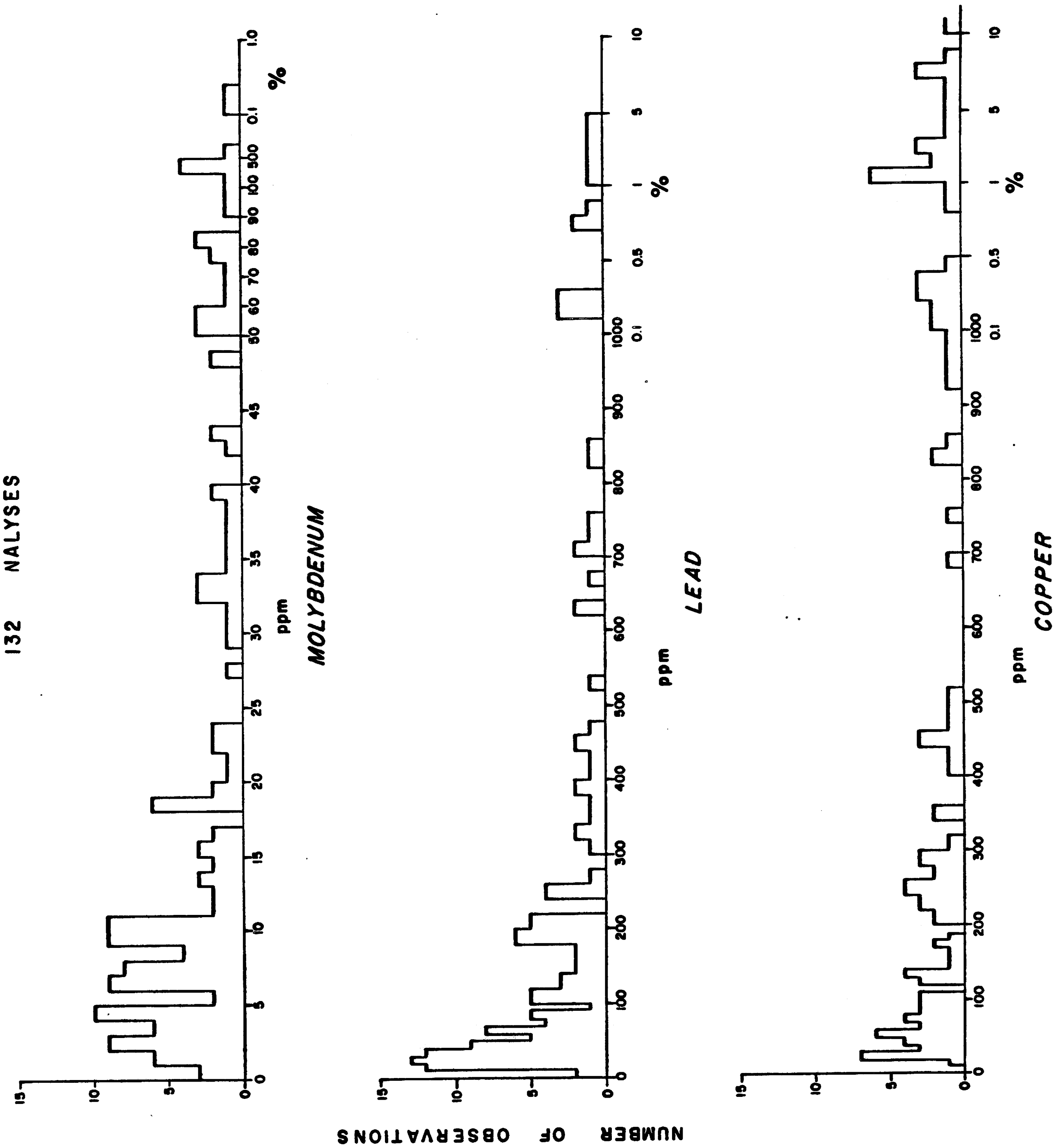
Lead: High Pb values ranging from 25ppm to 5% are present along the southern margin and outside of the strong phyllic zone (Fig. 14). The distribution of Pb is assymetric about the ENE alteration-mineralization axis - high on the south and low to the north.

Mo/Pb Ratios: The ratio between the Mo and the Pb was calculated, plotted graphically in Figure 15 and contoured in plan on Figure 16 in order to compare the distribution of the high-temperature Mo with the lower temperature Pb. As shown in Figure 16, the greater than 1 Mo/Pb rato contours is clearly coincident with the more intense alteration zones (phyllic and mixed phyllic-propylytic) and highly aligned ENE.

Gold-Silver: The combined Au and Ag values, shown in Figure 17, are correlative in part with large through-going vein structures containing Cu or Pb.

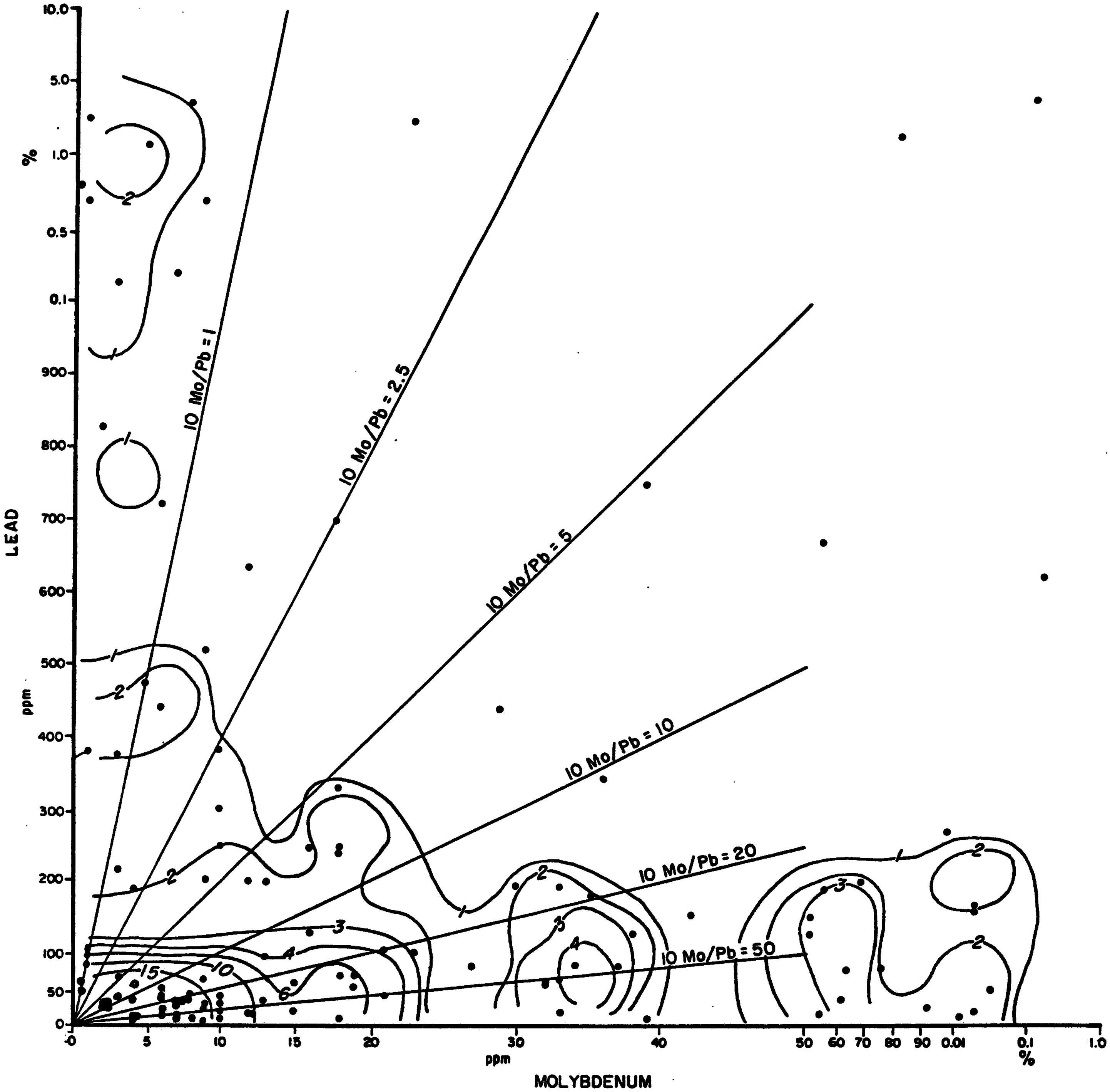
In general, the maximum geochemical values conform to their respective alteration zones; Mo in phyllic, Cu in phyllic or mixed propylytic-phyllic and in the diabase, Pb in propylytic and mixed zone, and Au and Ag scattered throughout.

KELVIN PROJECT
Pinal County, Arizona



HISTOGRAMS: Geochemical data analysis of vein material assays

FIGURE 11



Contours on 1,2,3,6,10,15 times the expected value in 10% of the area.

Figure 15

MOLYBDENUM / LEAD RATIO
KELVIN PROJECT
PINAL COUNTY, ARIZONA

Geophysics

A three line complex resistivity (CR) survey and two reconnaissance ground magnetometer surveys were completed in the Kelvin area. The CR survey, 2 N-S and 1 E-W lines (Fig. 18), was completed by Zonge Engineering and Research Organization and the results tabulated on Table II and shown in plan on Figures 18 through 23. Zonge's report is given in Appendix IV. The magnetometer survey data, consisting of 2 irregular-spaced surveys by Kerr-McGee and Occidental, were normalized then plotted in plan and contoured (Fig. 24).

Complex Resistivity: The CR data, resistivity, polarization (phase angles), and spectra correlate quite well with the mapped alteration zones and with known structures. The following correlations are apparent for each alteration zone, and for the unaltered Gila conglomerate:

Alteration	Resistivity (ohm-meter)	Polarization (phase shift)	Spectral Type
Phyllic	200-300	20-30	aB
Mixed	300-500	15-20	aB
Propylytic	150-200	12-15	BC
Gila congl.	100	12	Cc

Where: aB is characteristic of mixed pyrite-chalcopyrite with strong alteration

B is characteristic of weak pyrite with chlorite

Cc is characteristic of weak to barren sulfide with clay-chlorite alteration

The CR data indicate continuity of sulfide mineralization with increasing depth in the phyllic and mixed alteration zones. This is in marked disagreement with the Kerr-McGee working model which shows flat-faults bottoming mineralization (Figs. 7 and 8). Instead, as illustrated by the distribution of the resistivity and phase angles (Figs. 18-23), the high-resistivity (300 ohm-meters) - high polarization (20 milliradians) boundary migrates to the south and to the west with increasing depth delineating the trace of the Jeep Trail-Ripsey Wash décollement and the Diamond Hill fault where high resistivity-low polarizing rocks underly the intensly broken and weakly mineralized units found at the surface.

Magnetics: The magnetometer data (Fig. 24) correlate extremely well with lithology and structure; highs and high-low pairs occur over diabase and/or magnetite veins with low flat-relief responses present in weakly mineralized Ruin granite. Structures, such as the fault occupying the N-S wash immediately west of the Riverside breccia pipe and the Diamond Hill fault, are characterized by sharp discontinuities in the data.

Joe Wilkins

REPORT ON THE GEOLOGY, GEOPHYSICS, AND EXPLORATION POTENTIAL OF THE KELVIN (RIVERSIDE) PORPHYRY PROSPECT PINAL COUNTY, ARIZONA WITH RECOMMENDATIONS

Tucson Area Office

Joe Wilkins
Tom L. Heidrick
Greg Wessel

Joe Wilkins

November, 1977

Table II. Complex Resistivity Survey Results, Kelvin Project, Pinal Co., Arizona

LINE NO.	RESISTIVITY				POLARIZATION				SPECTRAL DATA			
	Location	Magnitude Ohm-meter	Alteration Type	Contact Location	Location	Magnitude Phase	PFE	Estimated Sulfides %	Location	Type	Interpretation Sulfides	Alteration
Line 1	5-7	500	Phyllic	5	5-6	> 25	> 3.5	3-5	4-6	aB	Py-Cpy	Phyllic
	2-5D	>300	Phyllic	5	2-5	25	3.0	2-3	2-4	aB	Py-Cpy	Phyllic
	1-5S	<200	Prop	n = 2	4-1	10	1.5	1	4-1	B	wk Py	Propylytic
	-1-2D	200	Prop	2					1	Cc	Barren	Chloritic
Line 2	5-8	300	Phyllic	6	4-8	25	3.0	2-3	3-7	ab	Py-Cpy	Phyllic
	2-6D	> 300	Phyllic	5	3-6	25	3.0	3-5				
	1-6S	<200	Prop	4-6	1-5s	< 15	2.0	1	1-6	Bb	wk Py	Propylytic
	8	<200	?	8	8	20	2.5	2-3	8	ab-B	Py-Cpy(cc)	Phyllic
Line 3	-1-2	<100	Gila Cg	2	-1-2	12	<2	0	-1-2	b-C	barren	Gila Congl
	2-5S	150	Prop	5	2-5	12	<2	<1	2-5	Bb	wk Py	Chloritic
	3-5D	300	?	5	2-5	15	2	1-2	4-6	B-ab	Pyrite	wk Phyllic
	5-8	> 300	Phyllic		5-8	> 20	> 3	2-3		Bb-ab	Py-Cpy	wk Phyllic

D indicates deep
S indicates shallow

CONCLUSIONS

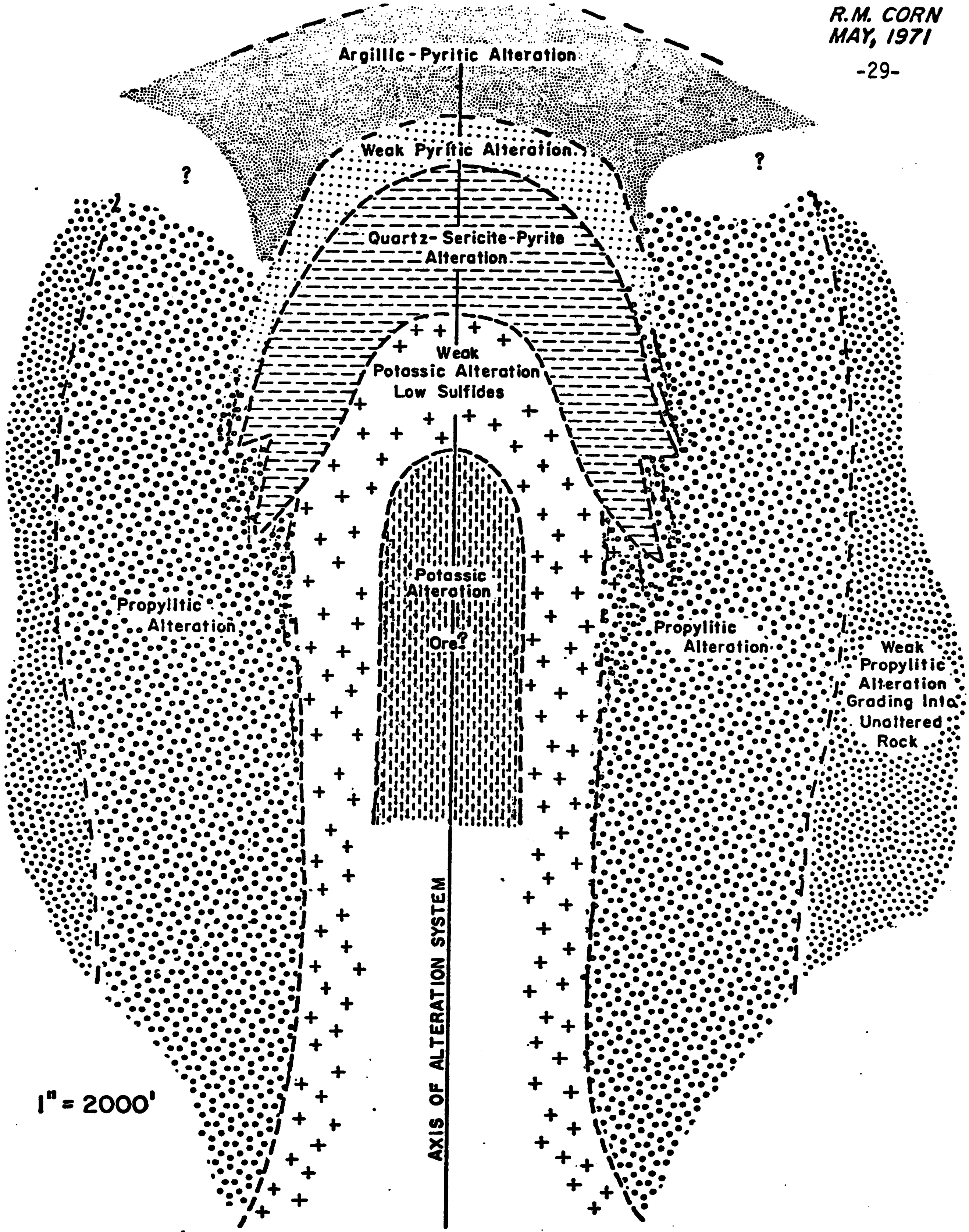
Regional structure-tectonic compilations-analyses (Figs. 4 and 5), detailed geologic mapping (Figs. 2 and 3), alteration-mineralization studies (Figs. 10 and 11), geochemical dispersion patterns (Figs. 12-17), coupled with complex resistivity (Figs. 18-23) and ground magnetometer (Fig. 24) data combine to delineate an upright although somewhat fragmented porphyry copper system in the SW¼ of section 12, R13E, T4S, Pinal County, Arizona. The outcropping portion of the system considered herein lies immediately SW of Riverside and south of Kelvin.

The delineated zone of intense phyllic plus mixed phyllic-propylytic alteration (Fig. 10) when considered in concert with the dispersion of molybdenum (Fig. 13) and the Mo X 10 / Pb ratio (Fig. 16) within rocks of the leached cap, define a potentially productive porphyry system with an ENE-trending semi-major axis of +5000 feet and semi-minor axis of +3000 feet (1.2 million tons/vertical foot). Complex resistivity Line 2 (Figs. 18-23) suggest that pyrite (py) + chalcopyrite (cp) metallization persists continuously to depths of 2500 feet at least. The CR signatures are not clearly diagnostic and estimates of cp/py ratios remain indeterminant.

As indicated by our regional geologic compilation and cross section (Fig. 4, A"-A"'), the Kelvin (Riverside) alteration-mineralization system is housed in the down-faulted east-dipping homoclinal limb of the Tortilla (Riverside) monocline. If this interpretation is correct, the system delineated is essentially upright and it seems unlikely that a west-dipping flat fault floors the system. The sub-horizontal attitude of the weak oxidized chalcocite blanket established by shallow OxyMin drilling likewise indicates an absence of west-dipping cycloidal faulting since oxidation-enrichment.

Based on data acquired during exploration-development of the San Manuel-Kalamazoo deposit, Lowell and Guilbert (1970) postulated that porphyry copper deposits normally exhibit concentric patterns of alteration and mineralization. Alteration types recognized at Kelvin (Riverside) are identical in most respects as those encountered at San Manuel. The ore zone at San Manuel-Kalamazoo totals in excess of one billion tons, occurs as an open cyclindrical zone averaging 600 feet in wall thickness, and lies at the interface between a central zone of potassic alteration and the surrounding zone of phyllic alteration. The outer diameter of the phyllic-ore-potassic-ore-phyllic alteration-mineralization system is just over one mile. More recent observations, however, by Kerr-McGee at Red Mountain, Arizona and elsewhere by others, help define an important and common variant of the Lowell and Guilbert model. Figure 25 summarizes many of the more salient aspects of the "restricted phyllic envelope" model as envisioned by Russ Corn of Kerr-McGee - a model he believed potentially applicable at Kelvin-Riverside. The most important facet of this model lies in the possibility of our having the axial portion of the alteration-mineralization system occupied by ore-grade material completely incased within rocks showing only weak potassic alteration containing low total sulfides.

Accepting an upright hypothetical system similar to that shown on Figure 25, the available Kelvin geology, geochemistry, and geophysics appear



Kerr-McGee Corporation

HYPOTHETICAL SYSTEM OF PORPHYRY COPPER ALTERATION

WITH RESTRICTED ENVELOPE OF QUARTZ-SERICITE-PYRITE MODELED AFTER RED MOUNTAIN IN SANTA CRUZ COUNTY

KELVIN AREA PINAL COUNTY ARIZONA

FIGURE 25

to fit quite well. As noted previously, the inhomogeneous distribution of mineralized joints, veins, and fault-veins in the mapped and sampled area (Fig. 2) produces a somewhat elliptical alteration-mineralization pattern in plan. Section A-A' (Fig. 3) bisects the area of most intense alteration-geochemical dispersion and is oriented parallel to the long dimension of the alteration ellipse. The hypothetical vertical axis of the ellipsoidal Kelvin alteration-mineralization cylinder, as defined by the common overlapping coincidence of intense mineralized fracturing, hydrothermal alteration, +50 ppm Mo mineralization, and +10 for the Mo X 10 / Pb ratio, lies at the common intersection of Sections A-A' and C-C' (Fig. 3). The geometrical consequences of the above proposed working model is summarized on cross section C-C' (Fig. 26). And if correct in principle, a vertical 2,500 foot drill hole collared at the common intersection of A-A' and C-C' might prove most interesting and rewarding. This is particularly true when one considers that the prospect:

1. Occupies a geologic setting knwon for its large protore tonnage (½-1 billion tons) containing 0.72% Cu and 0.02% Mo (i.e., Ray and San Manuel-Kalamazoo);
2. lies within an established mining area supporting a readily available work force;
3. has a readily available supply of water and power as well as railroad facilities;
4. is only 14 rail miles from the ASARCO and Kennecott smelters at Hayden (Fig. 1);
5. rests in an area of modest relief that is readily accessible by improved secondary and primary roads; and
6. underlies available patented mining claims held by M.S. and Lucy Wilkins and unpatented claims controlled by the Kerr-McGee Corporation.

Should the Kelvin core shown schematically on Figure 26 prove productive, these assorted plusses would ultimately contribute significantly to the 1990 economics of block caving, milling, and smelting and they should be viewed in terms of copper ore equivalency at the onset of exploration.

In summary, the delineated protore porphyry system recognized at Kelvin (Riverside) has many geologic, economic, and land status characteristics which make the prospect very attractive even during this period of adverse metal prices. Alteration-mineralization intensity and continuity plus the fracture frequency and intensity exposed over the buried target suggest drilling depths of ±2,500 feet. This inferred depth to potential ore is at best a crude estimate since the degree of alteration-mineralization telescoping beneath the flat diabase sill remains unknown. Geochemical work within and beneath the exposed upturned limb of the monocline in the Arizona-Sultana mine area (Fig. 12) and the localization of copper mineralization in similar diabasic units at Ray, clearly demonstrate the effectiveness of the diabase as a receptive-reactive host for Cu-metallization and a barrier to Cu-bearing hydrothermal fluid flow. These data alone would tend to suggest that similar damming might be the rule beneath the diabase sill inferred to underlie the target area. If correct, the hypothetical bullet-shaped potassic core-ore zone might be somewhat mushroomed in transverse section (C-C', Fig. 3) and an oblate spheroid in longitudinal section (A-A', Fig. 3) - a geometry ideally suited for optimizing an underground block caving operation.

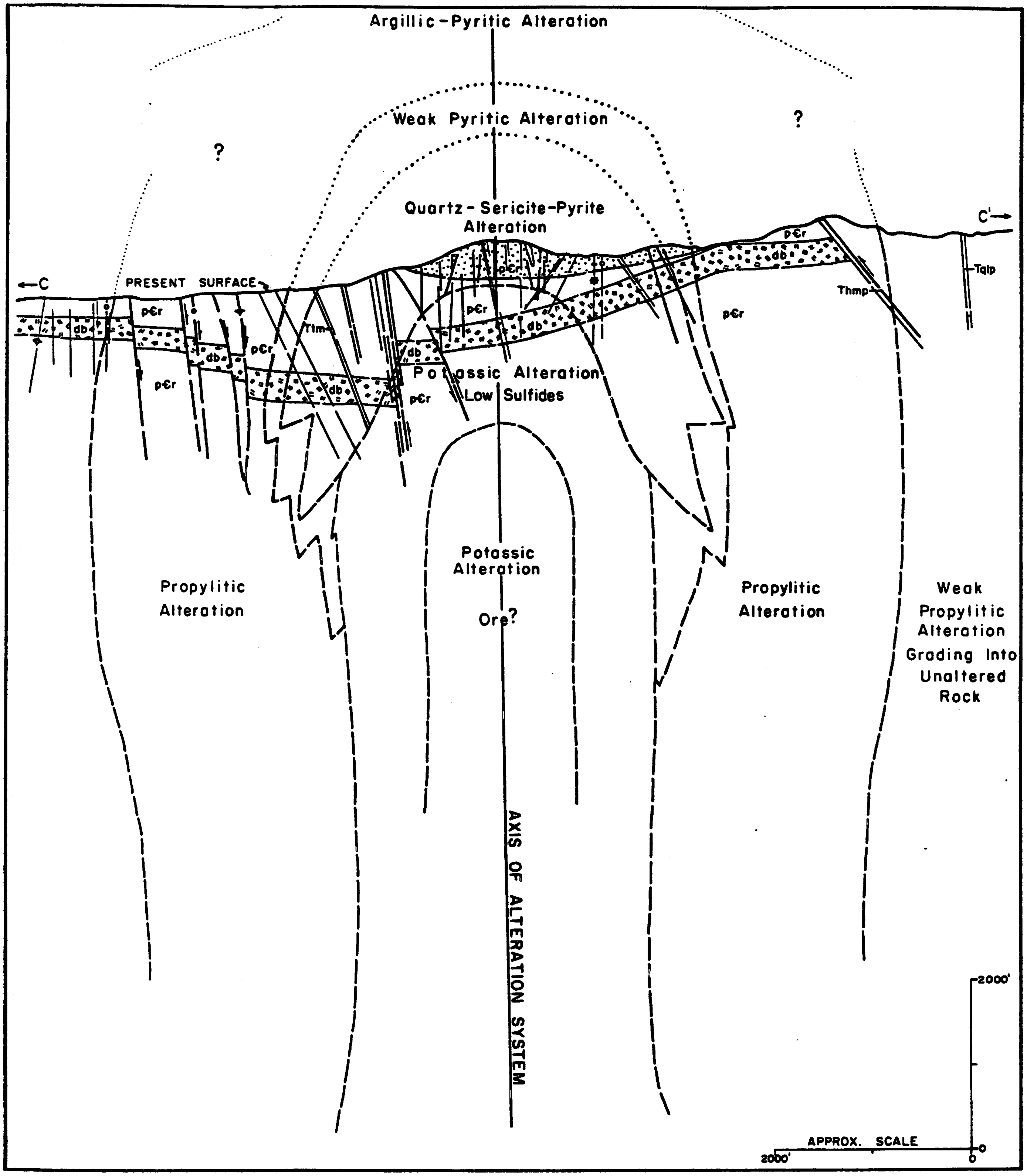


Figure 26. Conceptual model of the restricted phyllic alteration model as applied to the Kelvin porphyry prospect, along a portion of cross section C-C' (Fig. 3). View looks N70°E parallel to the long dimension of the intense structure-alteration-mineralization ellipse.

RECOMMENDATIONS

The time frame for acquiring, drilling, delineating, and developing the Kelvin porphyry Cu-Mo deposit would place Gulf in the ranks of copper producer in the early 1990's. And if the past "ups and downs" of the copper mineral industry is any indication of the future, a Kelvin-type high-grade porphyry play suited to underground development will not only be economically viable but an actively sought out resource in the 1990's. It is within this context that we recommend that:

1. Gulf continue to "push" for reasonable joint venture terms with Kerr-McGee Resources Corporation covering their 4,200 acre claim group shown on Figure 6. An outline of initial terms proposed by Kerr-McGee were conveyed to W.S. Cavender from E.E. Jones (Kerr-McGee's Director of Mineral Exploration) in September, 1977. Negotiations continue at present and suitable terms appear eminent.

2. We contact M.S. and Lucy Wilkins, Star Ranch, Rt. 1, Box 140, Morgan, Texas (76671). The Tucson office contacted them on October 18, 1977 concerning the availability of their 27 patented lode mining claims (523.47 acres) shown on Figure 6. They indicated that the property was available and showed an interest in pursuing talks with GMRC. No follow-up work insued but it seems in order at this time.

3. The land department complete the detailed land status check requested on November 3, 1977 (Heidrick-Wilkins/Pickard). Preliminary phone conversations with the Albuquerque office confirm our earlier preliminary findings summarized on our land status map (Fig. 6). The Wilkins' patented claims are as indicated, as are the Kerr-McGee claims; however, additional information is needed concerning the small unstaked fractions overlying parts of the hypothetical ore zone and the apparently open ground immediately to the north of the Wilkins' property. If open ground exists south of the Gila River and within section 12, R13E, T4S as shown on Figure 6, it should be staked providing recommendations 1 and 2 (above) are feasible.

4. The Tucson office complete additional areal mapping and sampling in order to fully evaluate the mineral potential of the entire Kerr-McGee claim block as well as the superjacent holdings of Cities Service (Grayback claims, south and west of the Keri group, Fig. 6). Productive porphyry Cu-Mo deposits of the American Southwest commonly occur in clusters, and additional systems parasitic to the Kelvin play may exist along with other blind occurences caught up in the Ripsey Wash décollement. This suggested work is timely since Cities terminated copper exploration during 1977; and the Grayback data will almost certainly come available to GMRC early in 1978. These areal studies would clearly contribute to our evaluation of their rumored "weak potassic-low total sulfide intercepts lying beneath a flat westward dipping fault".

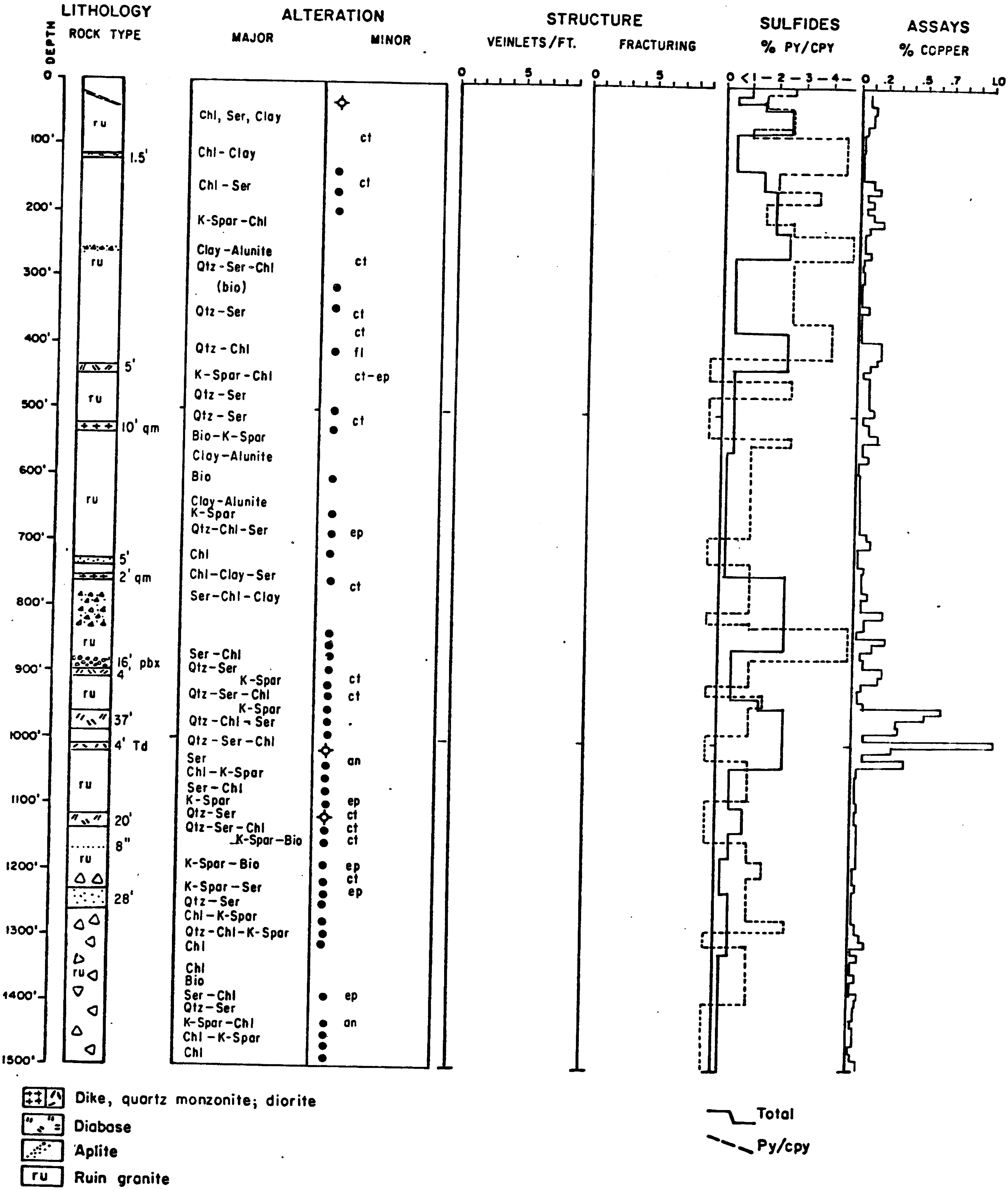
APPENDIX I

KERR-MCGEE DRILL LOG

SUMMARIES FOR K-1 THROUGH K-8

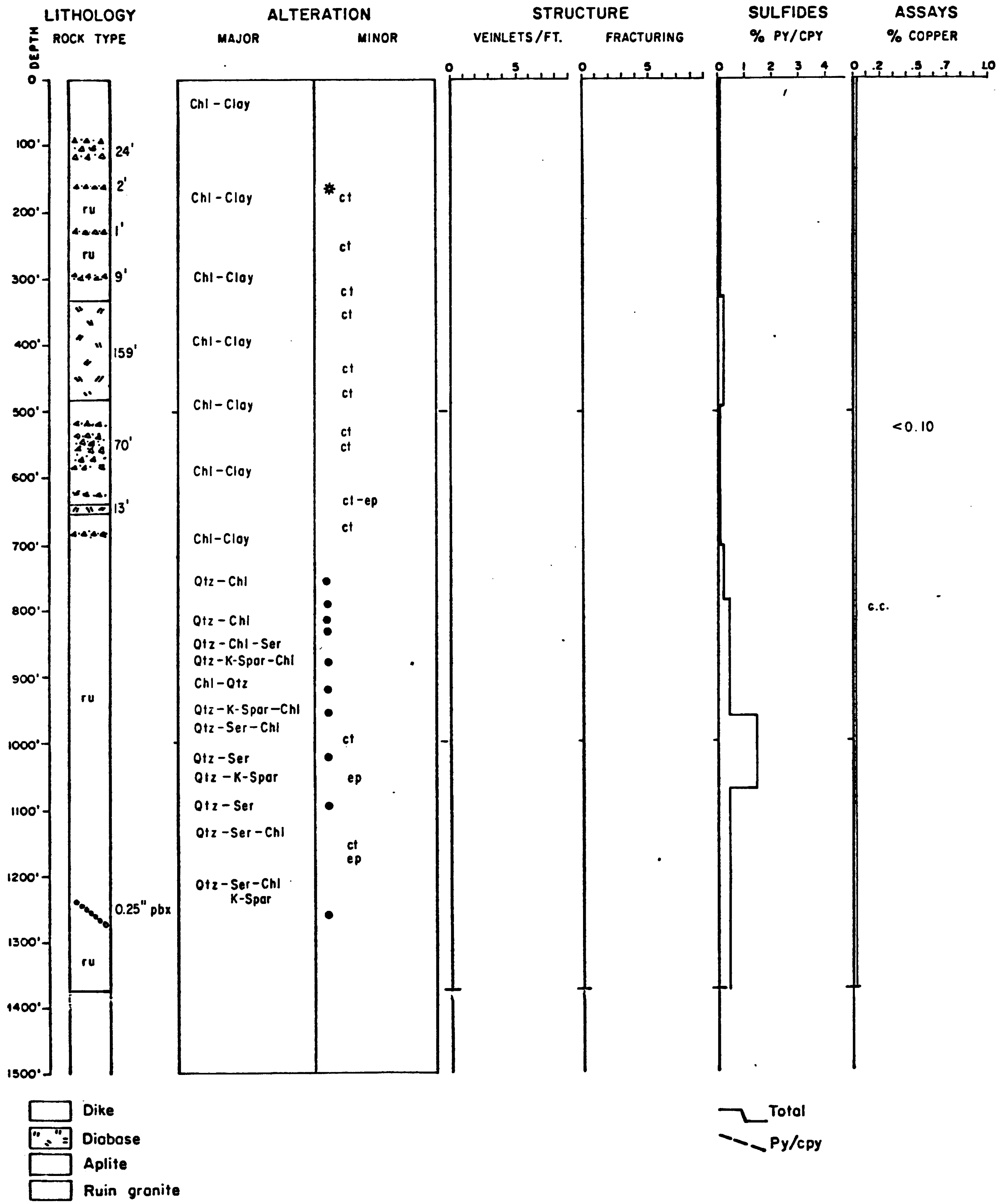
DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-1
T.D. 1500'



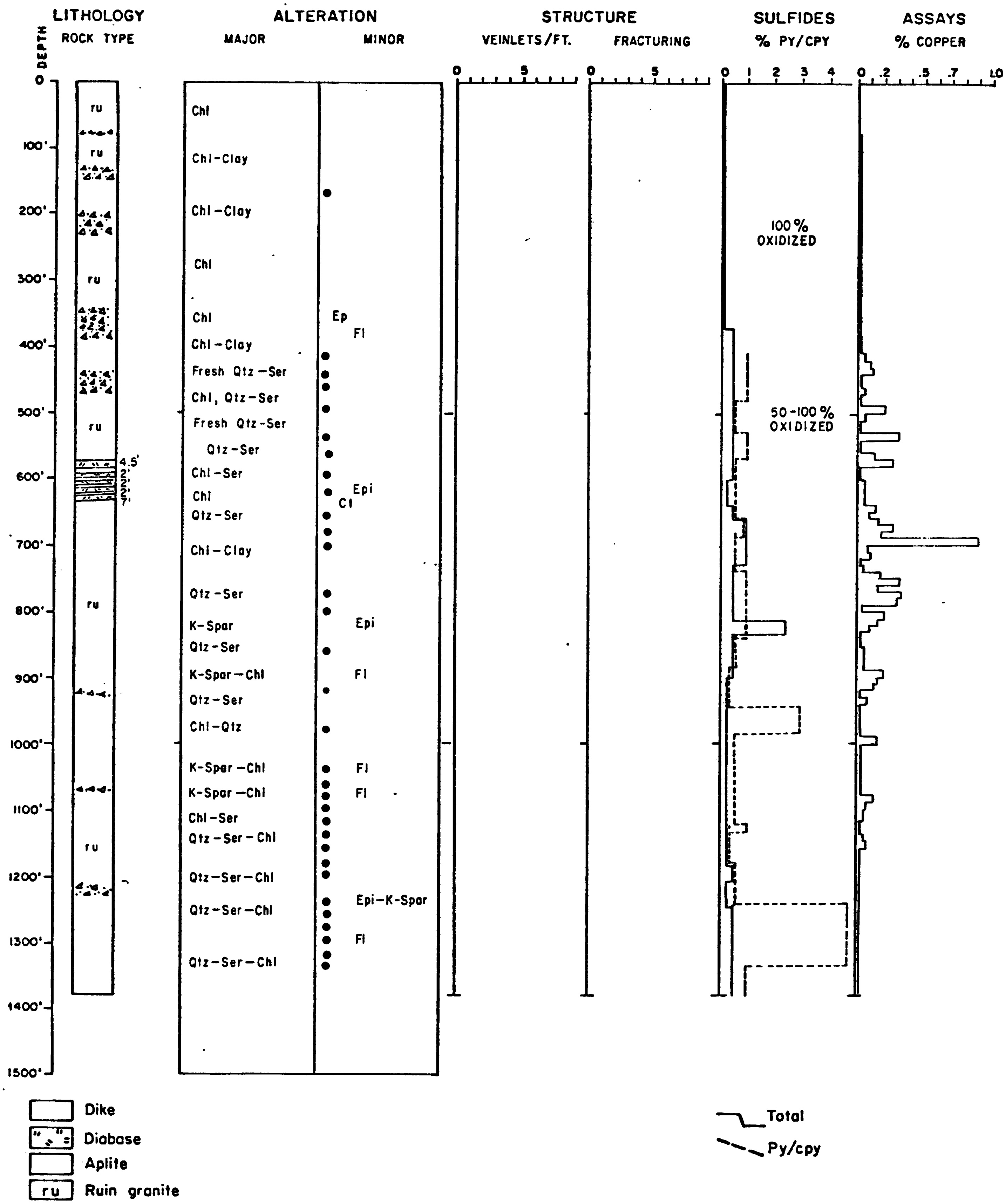
DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-2
T.D. 1377'



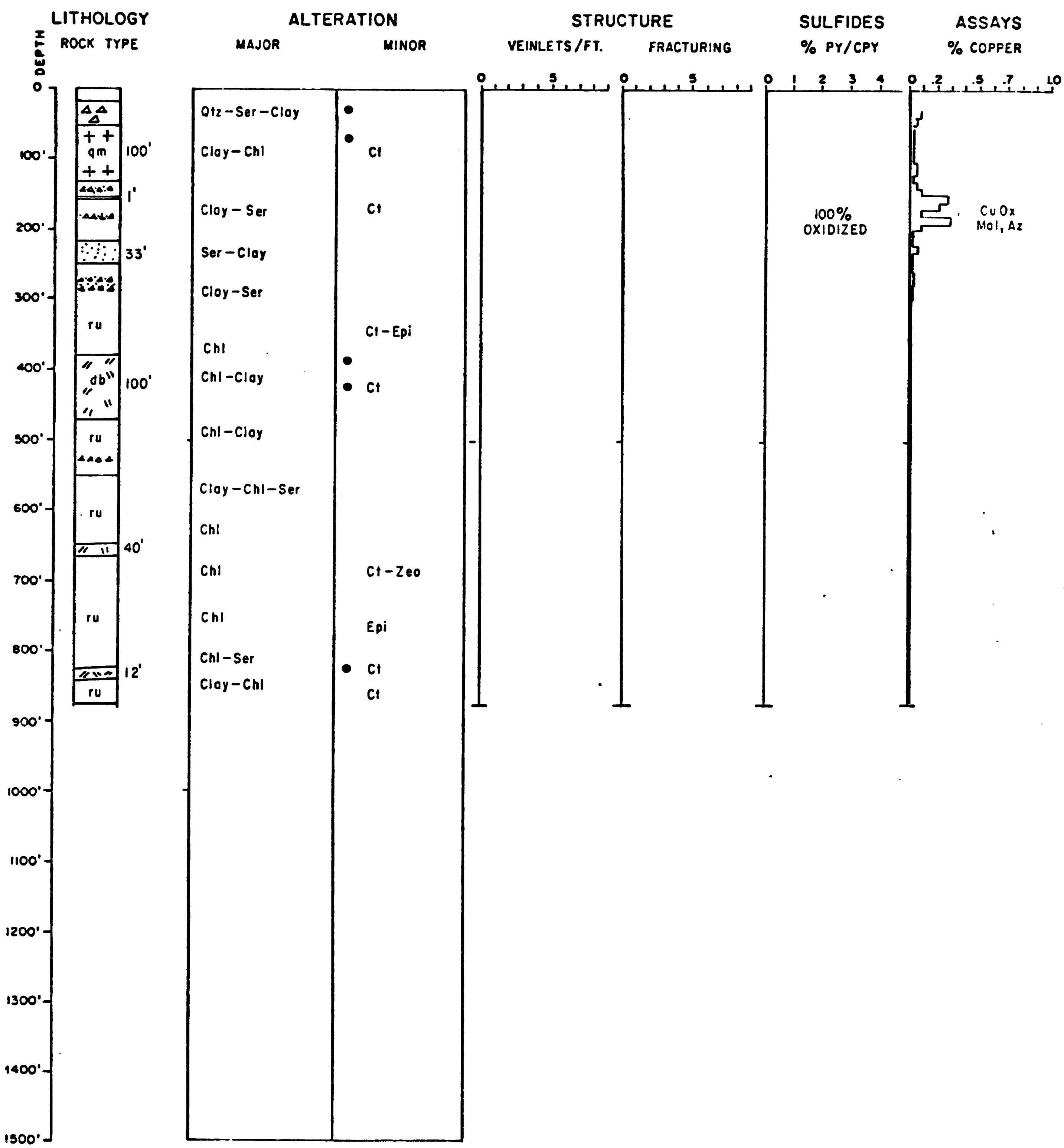
DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-3
T.D. 1386'



DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-4
T.D. 875'

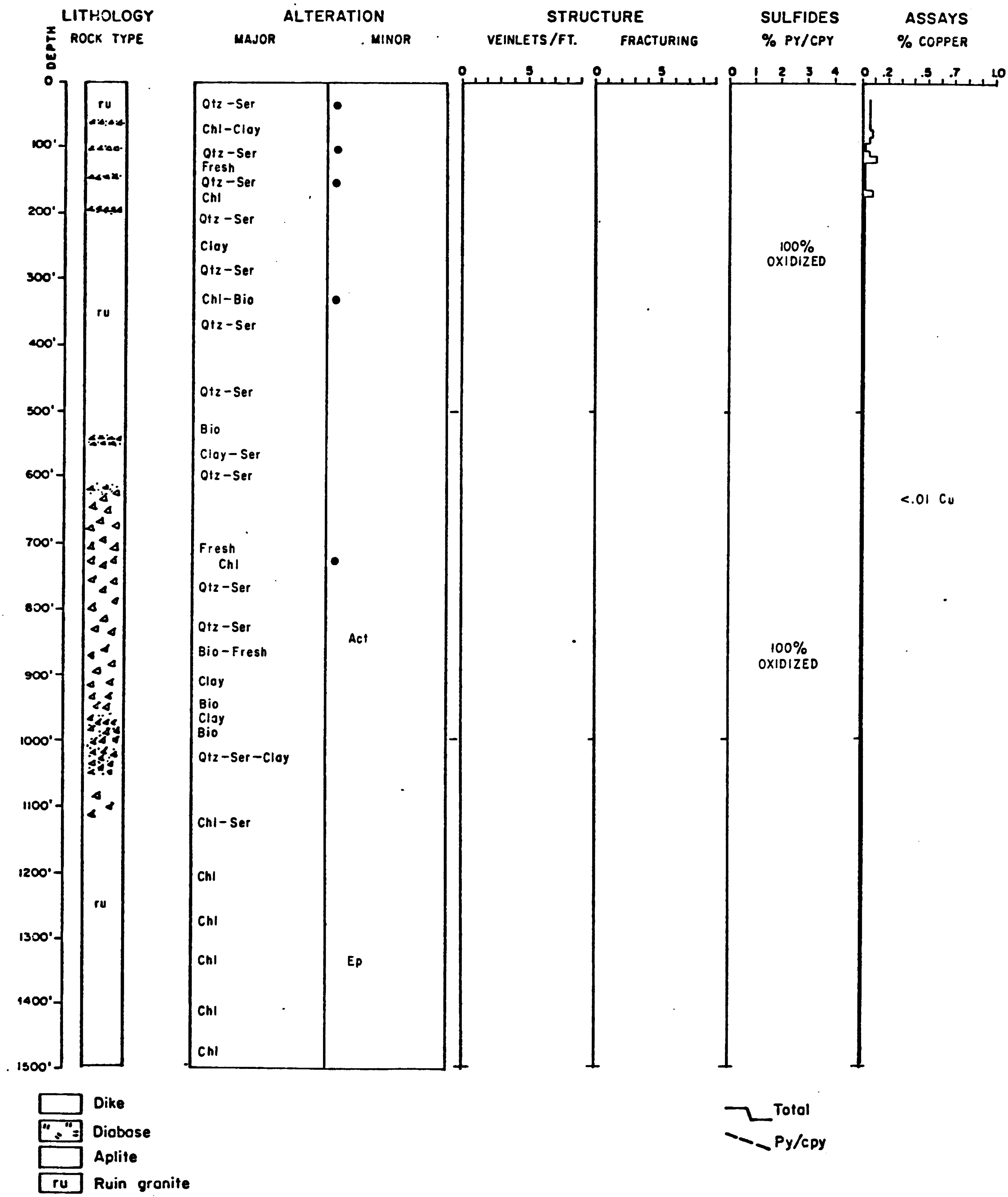


Dike, quartz monzonite porphyry
Diabase
Aplite
ru Ruin granite

Total
Py/cpy

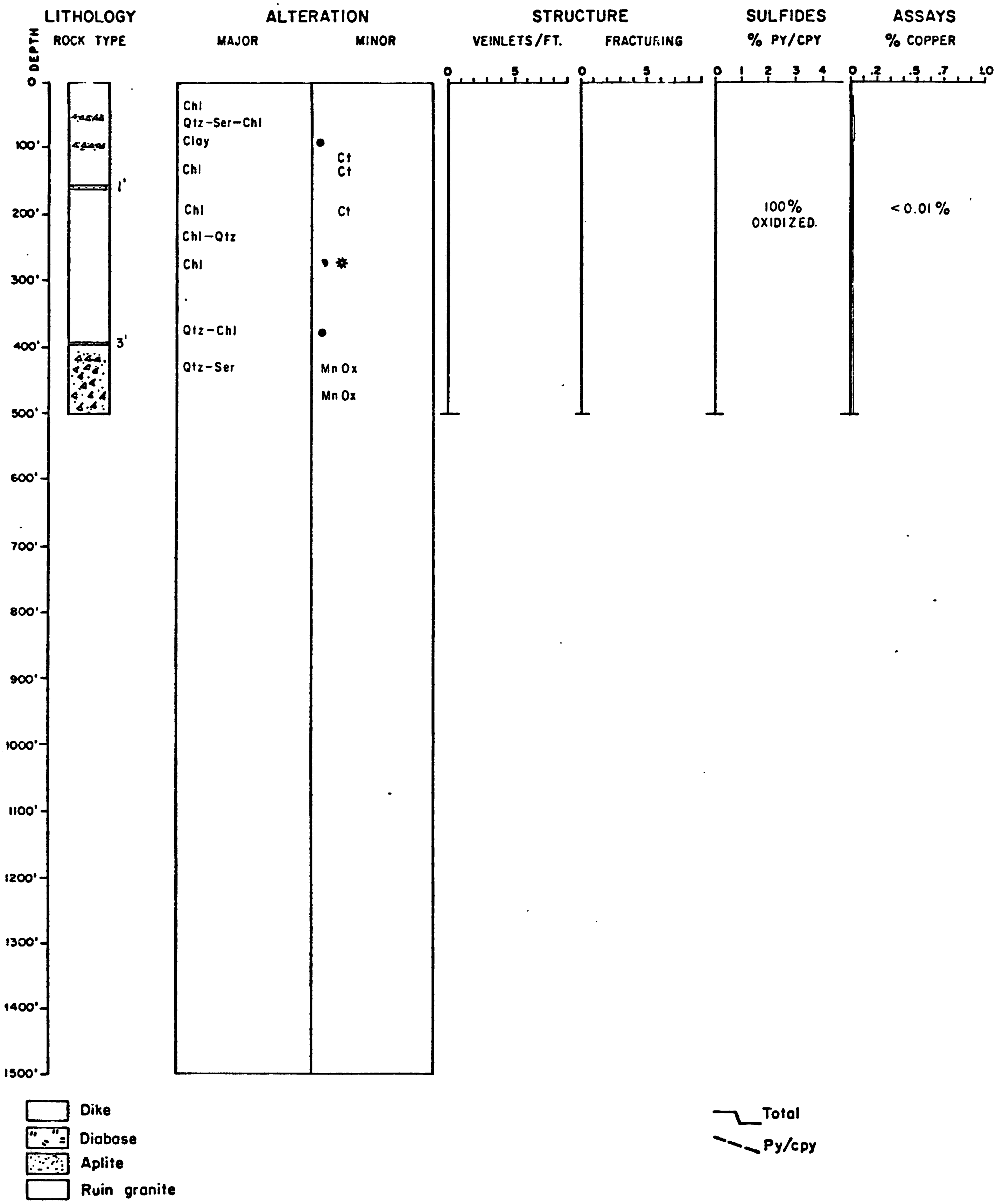
DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-5
T.D. 1497'



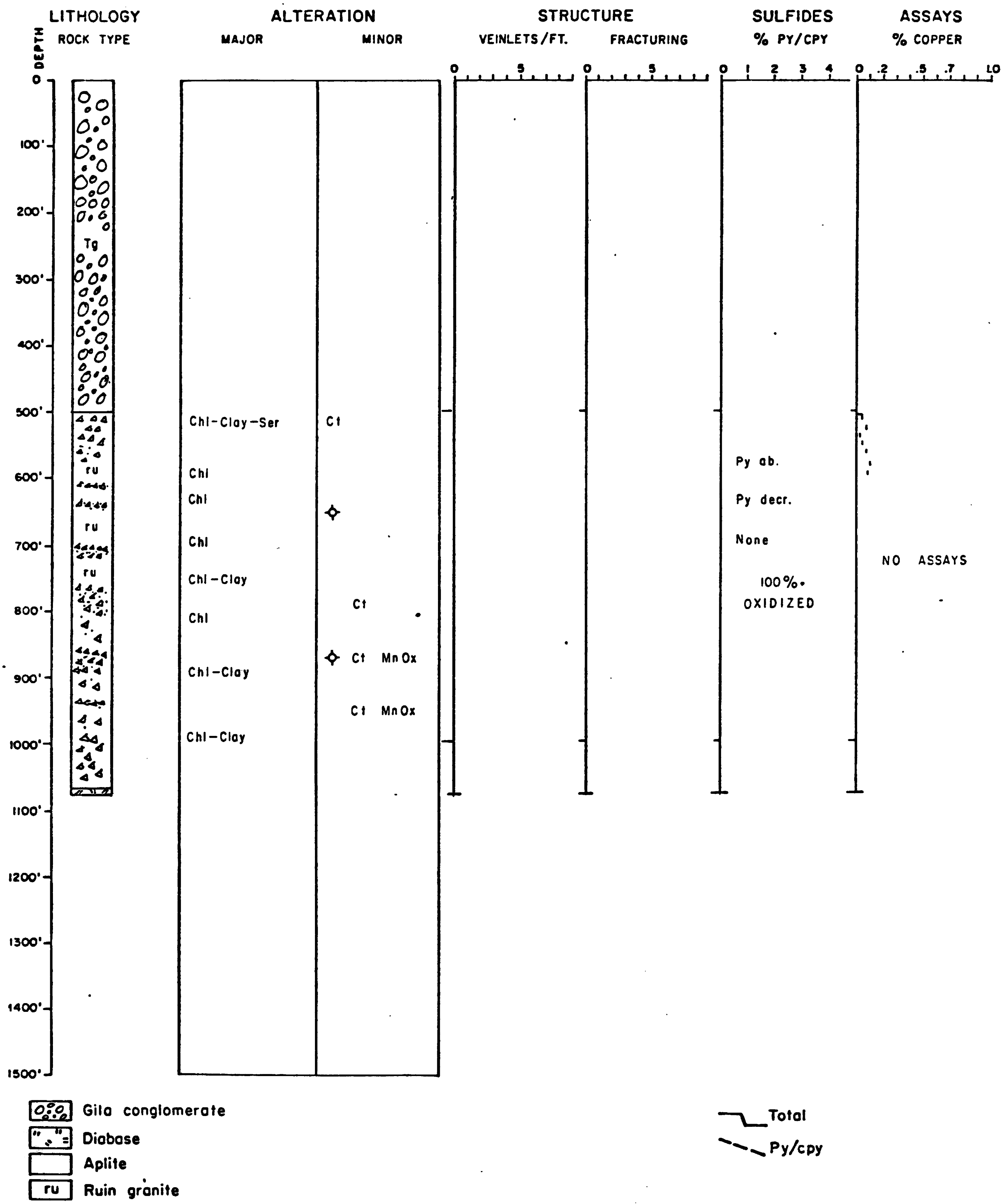
DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-6
T.D. 500'



DDH SUMMARY
KELVIN PROJECT
PINAL COUNTY, ARIZONA

DDH- K-7
T.D. 1077'

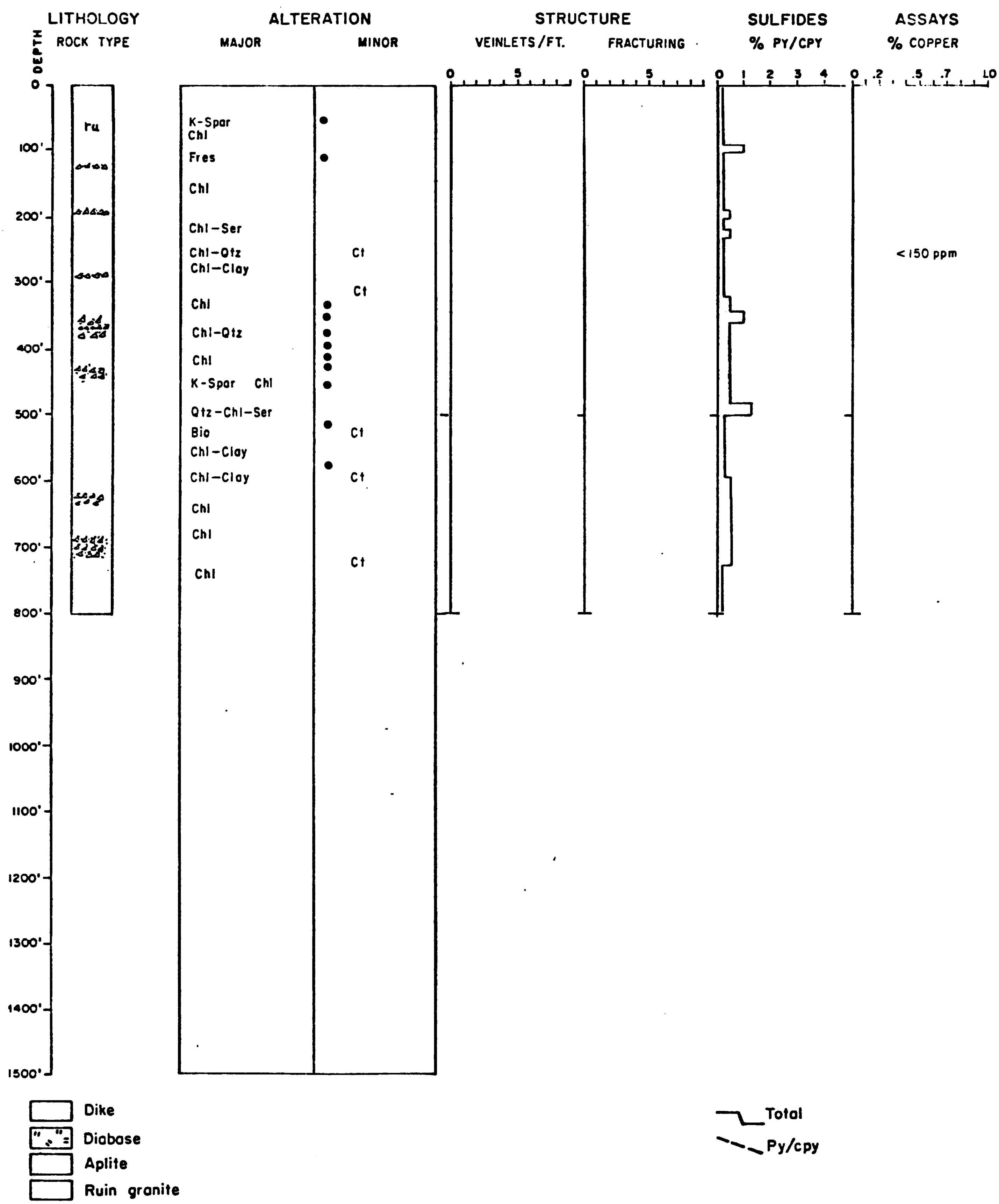


DDH SUMMARY

KELVIN PROJECT

PINAL COUNTY, ARIZONA

DDH -- K-8
T.D. 802'



APPENDIX II

MINING CLAIMS FOR KELVIN AREA

a. Kennecott Copper Corp.
b. Rosa Lee (R.R. Deen)
c. Other

APPENDIX IIa

KENNECOTT COPPER CORP. MINING CLAIMS

Riverside Mining District

Pinal County, Arizona

ERMAN Claim Group

Claim	Book	Docket	Location	
ERMAN 1	537	209	1500'S, 3500'W	Common Corner Secs. 5, 6, 7, & 8
2		210	2100'S, 3500'W	T4S, R14E
3		211	2700'S, 3500'W	"
4		212	2700'S, 2000'	"
5		213	3300'S, 3500'W	"
6		214	3600'S, 2600'W	"
7		215	3600'S, 2000'W	"
8		216	3600'S, 1400'W	"
9		217	4200'S, 3600'W	"
10		218	4200'S, 3000'W	"
11		219	4900'S, 2000'W	"
12		220	300'S, 2200'W	Common Corner Secs. 7, 8, 17, & 18
13		221	900'S, 2200'W	T4S, R14E
14		222	1200'S, 1600'W	"
15		223	2100'S, 2200'W	"
16		224	2700'S, 2200'W	"
17		225	300'E	West ¼ corner, Sec. 18, T4S, R14E
18		226	900'E	"
19		227	1500'E	"
20		228	2100'E	"
21		229	2700'E	"
22		230	3300'E	"
23		231	3900'E	"
24		232	2700'E	North of Common Corner Secs. 17, 18,
25		233	2100'E	19, & 20, T4S, R14E
26		234	1500'E	"
27		235	900'N	"
28		236	300'N	"
29		237	150'W	¼ Sec. Corner, Secs 17 & 18, T4S, R14E
30	542	378	50'S, 1384'E	West ¼ Corner Sec. 18, T4S, R14E
31		379	1150'S, 3500'W	Common Corner Secs. 5,6,7, & 8, T4S, R14E

ANNUAL ASSESSMENT WORK:

	Book	Page	Work Filed
1977	880	773	Deepened DDH 1012 1640' to 1850'
1976	834	716	Deepened DDH 1012 1270' to 1640'
1975	794	881	-

Affidavit filed to cover ERMAN 1-31 and River 4-9, 13-18, and 22-27 claims.

River Claim Group July 17, 1972

Claim	Book	Docket		Location
River 1	673	385	1400'S, 295'E	NW Corner Section 13, T14S, R13E
2		386	1400'S, 885'E	"
3		388	1400'S, 1475'E	"
4		389	1400'S, 2065'E	"
5		390	1400'S, 2655'E	"
6		391	1400'S, 3245'E	"
7		392	1400'S, 3835'E	"
8		393	1400'S, 4425'E	"
9		394	1400'S, 5015'E	"
10	Dropped	1976	1500'S, 295'E	"
11	Dropped	1976	1500'S, 885'E	"
12	Dropped	1976	1500'S, 1475'E	"
13	673	398	1500'S, 2065'E	"
14		399	1500'S, 2655'E	"
15		400	1500'S, 3245'E	"
16		401	1500'S, 3835'E	"
17		402	1500'S, 4425'E	"
18		403	1500'S, 5015'E	"
22		404	4300'S, 2065'E	"
23		405	4300'S, 2655'E	"
24		406	4300'S, 3245'E	"
25		407	4300'S, 3835'E	"
26		408	4300'S, 4425'E	"
27		409	4300'S, 5015'E	"

APPENDIX IIb

ROSA LEE CLAIM GROUP
RIVERSIDE MINING DISTRICT
Pinal County, Arizona

Ownership: Ronald R. Deen
Star Route Box 128
Riverside, Arizona
(602) 363-5638

Claim Name	Date	Book	Docket	Location
Rosa Lee 2	4-3-62	323	591	9000'SE of Kelvin. Bound on S by Sec 13, on E by R.L.#4 in Sec 7, on W by Sec 12 (100'E-1400'W)
Rosa Lee 4	4-3-62	323	592	9500'SE of Kelvin. Bound on S by Sec 18, on N by St.Karl No.0 and contact, on E by R.L.#6, on W by R.L.#2 (100'W-1400'E)
Rosa Lee 1C	5-16-62	331	45	5680'SE of Kelvin. Bound on W by Sec 12, T4S, R13E, on E by R.L.#2C, on S by R.L.#1D (Sec 18, 4S 14E), on N by St. Karl, located in Sec 17, T4S R14E (60'S-1440'N)
Rosa Lee 1D	5-16-62	331	46	5740'SE of Kelvin. Bound on W by Sec 13, T4S R13E, on E by R.L.#2D, on S by R.L.#1E, on N by R.L.#1C, located in sec 18, T4S R14E (60'N-1440'S
Rosa Lee 3D	6-1-62	331	53	5140'SE of Kelvin. Bound on W by R.L.#2D, on E by R.L.#4D, on S by R.L.#3E, on N by R.L.#3C (Sec 7 T4S R14E), located in Sec 18 T4S R14E (80'N-1420'S)
Rosa Lee 2D	6-1-62	331	54	5940'SE of Kelvin. Bound on W by R.L.#1D, on E by R.L.#3D, on S by R.L.#2E, on N by R.L.#2C, in Sec 18, T4S R14E (150'N-1350'S)

RIVERSIDE CLAIM GROUP

Claim Name	Date	Book	Docket	Location
Riverside 9	7-25-68	543	609	Bound on W by River #12, on N by Riverside, in Sec 6, T4S R14E
Riverside 10	7-25-68	543	610	Bound on W by River #11, in Sec 6
Riverside 11	7-25-68	543	611	3300'S Common corner Sec 1,6,31,& 36-T3S R13E
Riverside 12	7-25-68	543	612	3900'S " " "
Riverside 13	7-25-68	543	613	4500'S " " "

APPENDIX IIc

OTHER MINING CLAIMS
RIVERSIDE MINING DISTRICT
Pinal County, Arizona

Claimant: James Gaylor, Universal Copper Company, Tucson Arizona

Claim Names	Book	Docket	Date	Location
Alice 1-6	?	?	?	probably Troy district
Gaylor 1-16	669	361	4-11-72	?
Gaylor 18-26				?
Jim 1-10	669	351	4-11-72	?
Kid 1-16	987	881	6-1-75	?
Kid 18-26	987	897	6-1-75	?

1977 assessment filed Book 879 page 991

Claim Name	Claimant	1977 Assessment Work
Dan	Albert Smith	Book 832 Page 268
Sun Goddess	Laberta Estes	Book 871 Page 559
Tipperary 1-13	J.P. Vroman	Book 837 Page 922

APPENDIX III

GEOCHEMICAL ASSAYS

Client Gulf Minerals Resources Date Aug 4, 1977 RMGC Job No. 77-49-28T

Sample No.	Cu ppm	Mo ppm	Pb ppm	Au ppm	Ag ppm
AZKE- 1	30	2	25	-0.1	-1
2	0.27%	18	700	0.7	12
3	55	6	445	-0.1	-1
4	1.35%	9	25	-0.1	2
5	0.96%	9	0.72%	0.2	31
6	225	1	0.71%	0.1	2
7	45	1	105	-0.1	-1
8	225	-1	0.82%	0.1	3
9	1.04%	16	130	-0.1	-1
10	0.86%	15	60	-0.1	1
11	75	2	830	-0.1	-1
12	0.49%	3	0.17%	0.1	4
13	30	2	30	-0.1	-1
14	245	29	440	0.1	5
15	75	9	205	-0.1	1
16	315	10	10	-0.1	-1
17	280	6	725	0.1	4
18	40	30	195	-0.1	2
19	55	3	215	-0.1	-1
20	10	5	475	-0.1	-1
21	20	1	95	-0.1	-1

By [signature]
Parry D. Willard

Client Gulf Minerals Resources Date Aug 18, 1977 RMGC Job No. 77-50-181

Sample No.	Cu ppm	Pb ppm	Mo ppm	Ag ppm	Au ppm
AZKE 22	45	20	3	-1	-0.1
23	145	375	3	-1	-0.1
24	70	30	10	-1	-0.1
25	745	335	18	7	0.1
26	355	0.27%	1	4	0.5
27	35	35	7	-1	0.1
28	290	35	8	2	0.1
29	135	5	4	-1	-0.1
30	170	5	9	-1	0.1
31	65	25	2	-1	-0.1
32	0.10%	55	6	-1	-0.1
33	230	95	13	-1	-0.1
34	125	150	51	3	0.1
35	135	10	8	-1	-0.1
36	1.10%	10	39	3	-0.1
37	930	635	12	3	0.1
38	70	15	12	-1	-0.1
39	180	20	33	-1	-0.1
40	425	15	7	-1	-0.1
41	505	30	7	2	-0.1
42	50	15	53	-1	-0.1
43	260	40	66	1	-0.1
44	95	30	9	-1	-0.1
45	95	85	37	2	0.2
46	255	15	12	-1	-0.1
47	290	350	36	5	-0.1

ROCKY MOUNTAIN GEOCHEMICAL CORP.
SALT LAKE CITY, UTAH • RENO, NEVADA • TUCSON, ARIZONA

Client Gulf Minerals Resources Date Aug 18, 1977 RMGC Job No. 77-50-18T

Sample No.	Cu ppm	Pb ppm	Mo ppm	Ag ppm	Au ppm
AZKE 48	0.12%	3.9%	8	+100*	2.7
49	100	160	0.032%	2	-0.1
50	2.7%	4.2%	0.247%	+100*	21.7
51	135	180	35	8	-0.1
52	240	55	32	1	-0.1
53	55	20	10	-1	-0.1
54	4.4%	520	9	16	0.6
55	0.32%	50	0.050%	5	-0.1
56	95	250	10	-1	-0.1
57	85	10	4	-1	-0.1
58	250	10	7	-1	-0.1
59	450	65	3	4	-0.1
60	820	250	18	29	-0.1
61	7.4%	200	69	16	-0.1
62	980	25	4	-1	-0.1

*fire assay report to follow from Salt Lake City

By [signature]
Parry D. Willard

Sample No.	oz/ton Silver	ppm U_3O_8
AZKE 48	4.34	
AZke 50	17.91	0.12%

ROCKY MOUNTAIN GEOCHEMICAL CORP.
SALT LAKE CITY, UTAH • RENO, NEVADA • TUCSON, ARIZONA

Client Gulf Minerals Resources Date Aug 26, 1977 RMGC Job No. 77-51-24T

Sample No.	Cu ppm	Pb ppm	Mo ppm	Au ppm	Ag ppm
KESP	50	20	15	-0.1	-1
AZKE 63	35	30	7	0.1	-1
64	20	15	6	-0.1	-1
65	45	25	92	-0.1	2
66	60	35	13	-0.1	-1
67	7.6%	65	33	0.2	-1
68	6.1%	40	8	0.2	24
69	5.4%	190	4	0.2	3
70	970	275	98	-0.1	2
71	10.8%	45	4	-0.1	24
72	2.12%	25	6	-0.1	2
73	7.5%	35	6	-0.1	2
74	1.22%	40	6	-0.1	15
75	0.24%	1.75%	82	-0.1	14
76	1.16%	305	10	-0.1	9
78	400	380	1	0.1	7
79	0.34%	2.25%	23	1.6	73
80	80	200	13	0.2	-1
81	850	625	0.12%	0.1	7
82	130	750	39	0.1	2
83	40	60	4	-0.1	1
84	175	40	3	-0.1	2
85	3.85%	165	210	-0.1	3
86	2.52%	80	27	0.1	8
87	1.94%	85	34	0.2	9

Client Gulf Minerals Resources Date Aug 26, 1977 RMGC Job No. 77-51-24T

Sample No.	Cu ppm	Pb ppm	Mo ppm	Au ppm	Ag ppm
AZKE 88	0.13%	385	10	0.3	11
89	0.38%	1.46%	5	0.2	19
90	1.13%	0.20%	7	0.1	29
91	470	70	19	-0.1	3
92	8.8%	100	23	0.1	9
93	1.14%	130	38	0.1	4
94	165	40	10	0.2	1
95	940	65	9	-0.1	4
96	455	250	16	0.1	21
97	345	80	75	-0.1	8
98	830	75	63	0.4	2
99	0.19%	70	18	0.5	11

By Parry D. Willard

Parry D. Willard

Client Gulf Minerals Resources Date Aug 31, 1977 RMGC Job No. 77-52-7T

Sample No.	Cu ppm	Pb ppm	Mo ppm	Au ppm	Ag ppm
AZKE 100	205	0.28%	84	-0.1	5
101	270	0.17%	10	0.1	15
102	25	110	43	-0.1	1
103	20	35	4	-0.1	-1
104	215	0.18%	2	-0.1	4
105	50	65	2	-0.1	-1
106	100	855	71	10.3	8
107	100	400	32	-0.1	13
108	25	80	6	-0.1	-1
109	685	330	9	-0.1	10
110	1.18%	110	22	-0.1	17
111	440	45	7	-0.1	-1
112	65	30	48	-0.1	-1
113	120	30	14	-0.1	-1
114	125	40	4	-0.1	-1

REGISTERED ASSAYER CERTIFICATE NO. 8888 Dnyanendra Amrutlal Shah DATE SIGNED Arizona U.S.A.

By D. A. Shah 8-31-77

Client Gulf Mineral Resources Co Date Sept 30, 1977 RMGC Job No. 77-54-14

Sample No.	Cu ppm	Mo ppm	Pb ppm	Au ppm	Ag ppm
AZKE 115	105	1	75	-0.1	1
116	65	18	240	0.1	4
117	775	33	195	-0.1	4
118	90	-1	60	-0.1	-1
119	30	-1	50	-0.1	-1
120	0.15%	21	40	-0.1	1
121	395	12	205	-0.1	-1
122	75	18	10	-0.1	-1
123	200	21	105	-0.1	1
124	55	15	20	-0.1	-1
125	350	261	20	-0.1	-1
126	65	2	30	-0.1	-1
127	705	106	15	-0.1	-1
128	290	51	130	0.2	8
129	220	42	155	0.3	8
130	30	55	670	-0.1	1
131	700	32	60	0.1	3
132	155	19	55	-0.1	8
133-134	0.84%	56	190	-0.1	76

By Parry D. Willard
Parry D. Willard

ROCKY MOUNTAIN GEOCHEMICAL CORP.
SALT LAKE CITY, UTAH • RENO NEVADA • TUCSON ARIZONA

APPENDIX IV

ZONGE ENGINEERING AND RESEARCH ORGANIZATION'S REPORT

REPORT ON COMPLEX RESISTIVITY
FIELD SURVEY
Kelvin, Arizona
For Kerr-McGee Corporation &
Gulf Mineral Resources Company

ZONGE ENGINEERING
& RESEARCH ORGANIZATION
5634 East Pima
TUCSON, ARIZONA 85712

14 October 1977

Tom L. Heidrick
Gulf Minerals Resources Co.
2015 N. Forbes Blvd.
Suite 105
Tucson, AZ. 85705

Dear Tom:

I apologize for being so late with this report, but a rash of last minute assessment work really overwhelmed us. Our normal turn around time is two to three weeks, depending upon the complexity of the survey. I hope this will not happen again.

We have found that an invaluable aid to the interpretation of geophysical data is the inclusion of all known geological data for cross correlation. Very little geologic input was obtained for the analysis on your Kelvin Prospect, but the overall importance of including these data cannot be over-emphasized.

We are continuing to reduce the EM data acquired during the course of this survey and will provide you a summary of these data when completed. This analysis is still in the research stage and any additional information you can provide on this property would be appreciated and included in this final report.

If you have any questions on this report, please do not hesitate to call upon us for an explanation.

Best regards,

Ken

Kenneth L. Zonge

cc: R.M. Corn

Phone 602 885-3478

ZONGE ENGINEERING
& RESEARCH ORGANIZATION
5634 East Pima
TUCSON, ARIZONA 85712

14 October 1977

Report on Complex Resistivity Field Survey
Kelvin, Arizona
For Kerr-McGee Corporation &
Gulf Mineral Resources Company

Introduction:

Zonge Engineering and Research Organization mobilized a complex resistivity (CR) crew to Kelvin, Arizona, Pinal County, on August 11, 1977. The CR survey was run over a known area of disseminated pyrite/copper mineralization approximately 1.5 miles SW of Kelvin. The center of each of the three survey lines was located by Joe Wilkins of Gulf Mineral Resources.

The Z.E.R.O. crew was headed by Van Reed, geophysicst, and the field crew consisted of Arnie Ostrander, Gary Axion, and Mike Harbison.

Three separate survey lines were run over the Kelvin Property. Standard 1000 foot dipole-dipole techniques were used along with Z.E.R.O.'s high resolution complex resistivity equipment. Lines 1 and 3 were oriented north-south and Line 2 ran east-west, sharing a common center electrode with Line 1. Line 1 was cut short by two diagonals on the north end because it was not possible to cross the Gila River, which was at flood stage at that time. The crew was able to cross the Gila on Line 3 via a railroad bridge which was only 200 feet off line.

This survey was conducted during the peak season for thunderstorm activity in southern Arizona. However, the Z.E.R.O. CR field system is designed to minimize the effects of atmospheric noise, and in an attempt to further mitigate the problem the crew was in the field each morning at daybreak in order to utilize the early morning hours when thunderstorm activity was at a minimum. As a result the CR data collected on this survey was relatively clean considering the noisy conditions.

All field work was completed by 21 August, for a total of 11 days. One-half day was lost during this job due to a return trip to Tucson to repair equipment. In all, 9.4 field days for equipment and 10.1 field days for the field crew were utilized for the completion of this survey.

Phone 602 885-3478

Results of the survey are delineated on a line by line basis with the data presented in pseudosection form and explained in some detail by outlining the salient IP and CR features. A general explanation of our CR field techniques is also attached to the end of this report.

Summary:

Apparent resistivity, polarization and spectral type responses all tend to have a NW-SE trend. See Figures 1 through 5. Discounting the block of Gila Conglomerate off the south end of Line 3, the resistivity data show a low resistivity feature between Lines 1 and 3 and south of Line 2, with an increasing trend to the NE. (Figure 1).

Polarization data display a relatively high and pervasive background response which is generally attributed to alteration and small amounts of sulfides. The polarization feature beneath stations 5 and 6 on Line 1, 5 and 6 on Line 2, and on the northern end of Line 3 may all be related (Figures 2, 3). All have a relatively high alteration response and appear to contain pyrite with some chalcopyrite.

Spectral types tend to link these three anomalous areas, with the most noticeable feature being the type a spectra or low frequency "tail" which we associate with a strong alteration response. Although no ideal py/cpy spectral responses were obtained, several spectra on each line provided features associated with this type of response and examples are shown in the following description of the results for each line.

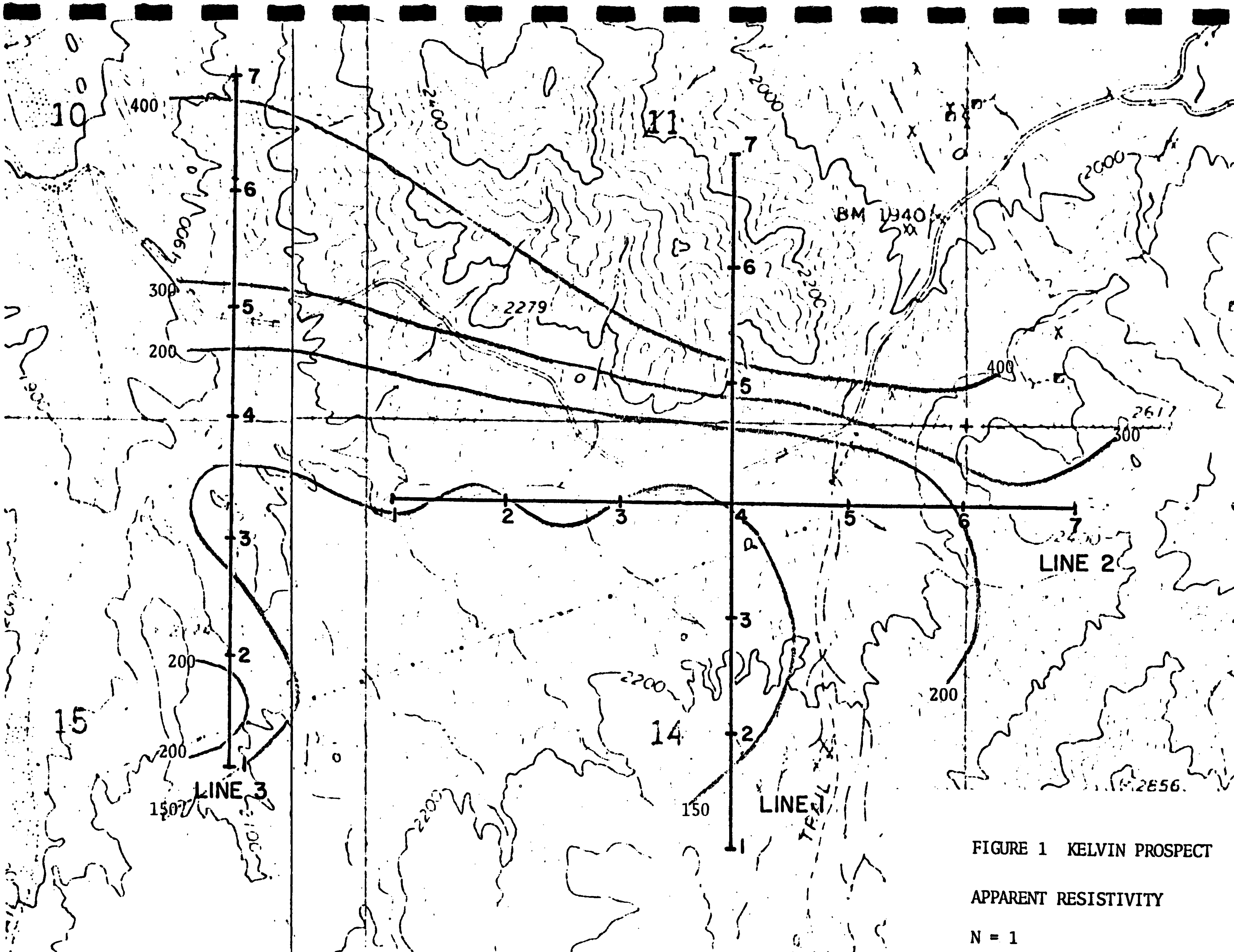


FIGURE 1 KELVIN PROSPECT

APPARENT RESISTIVITY

N = 1

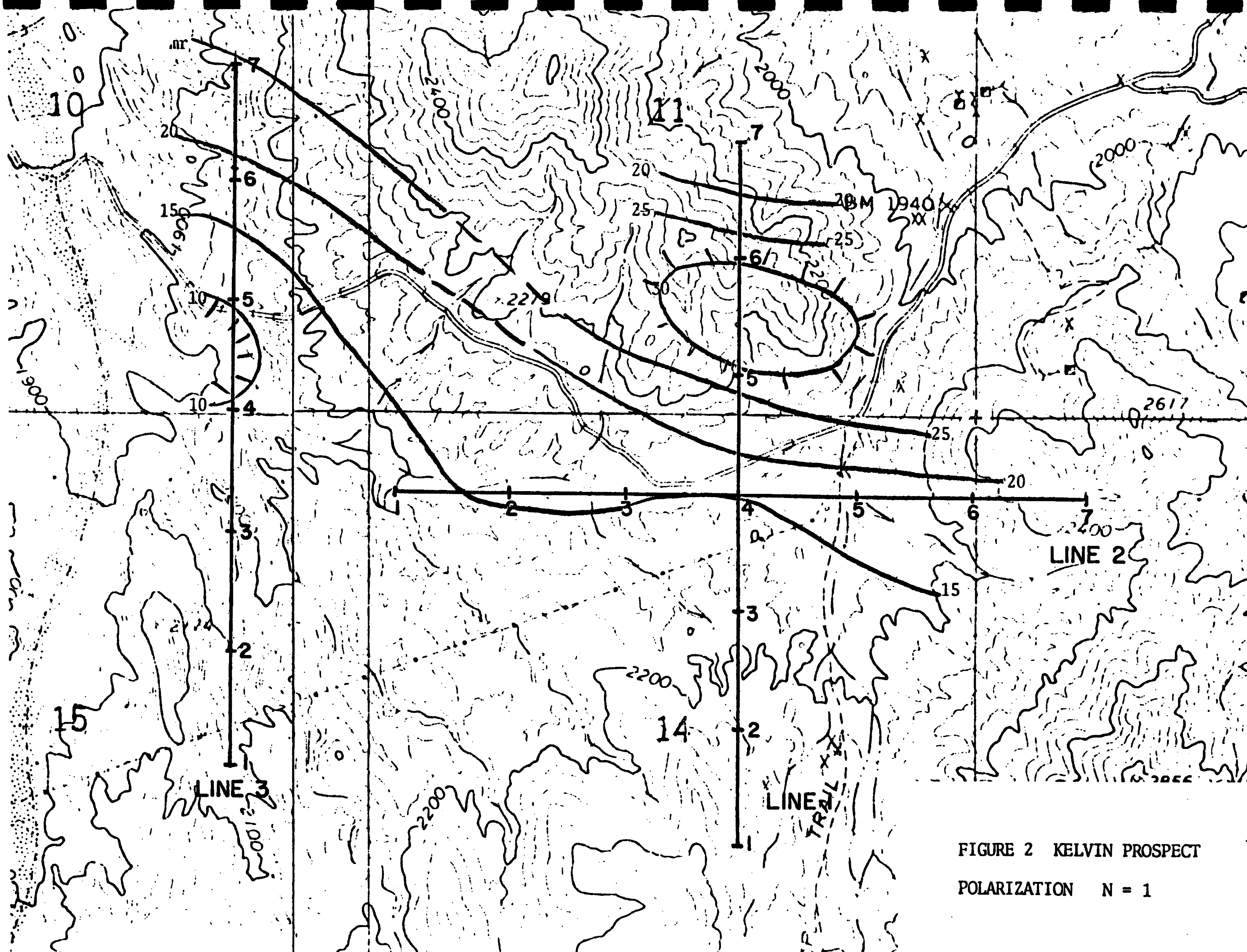


FIGURE 2 KELVIN PROSPECT

POLARIZATION N = 1

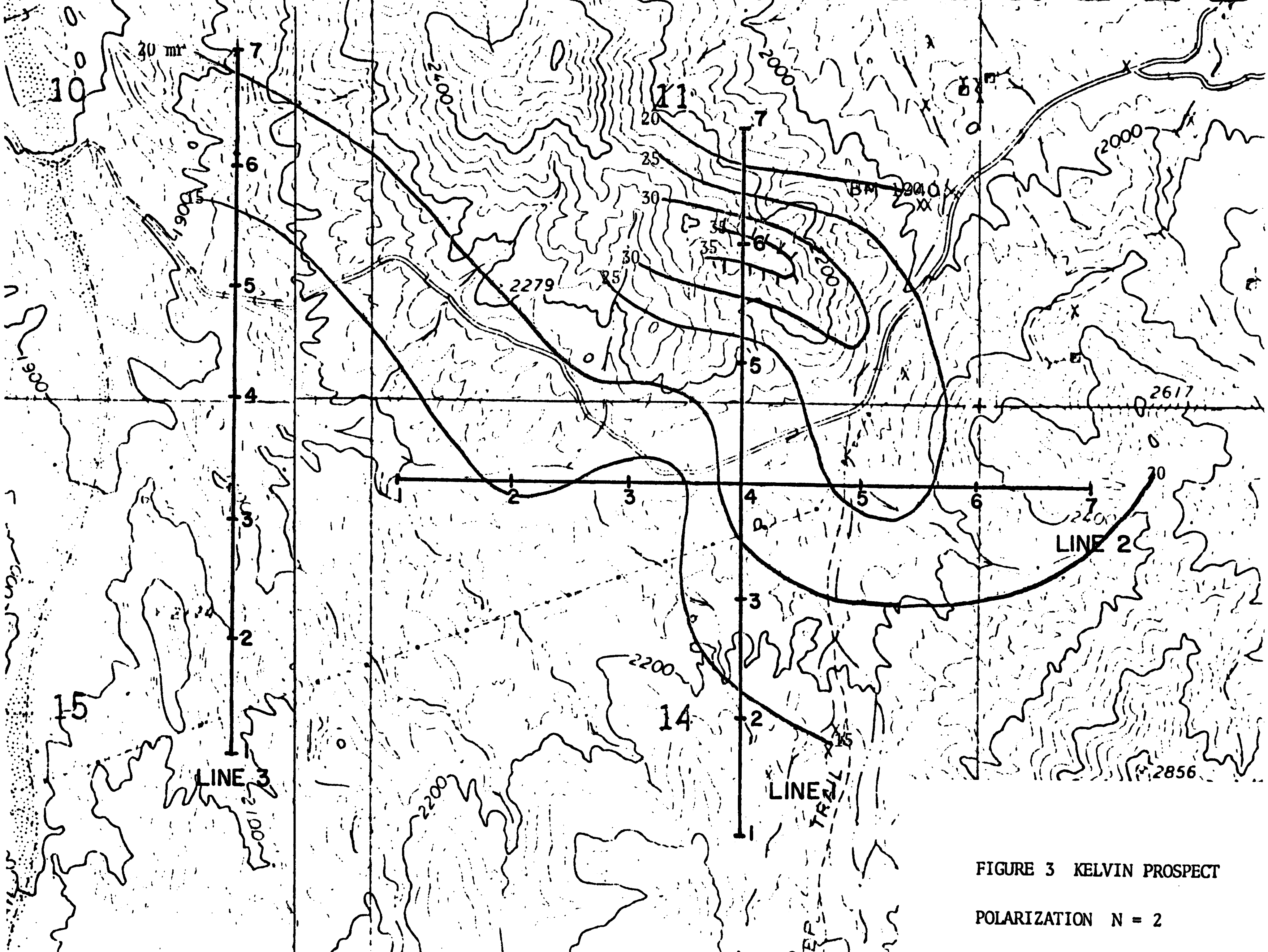


FIGURE 3 KELVIN PROSPECT

POLARIZATION N = 2

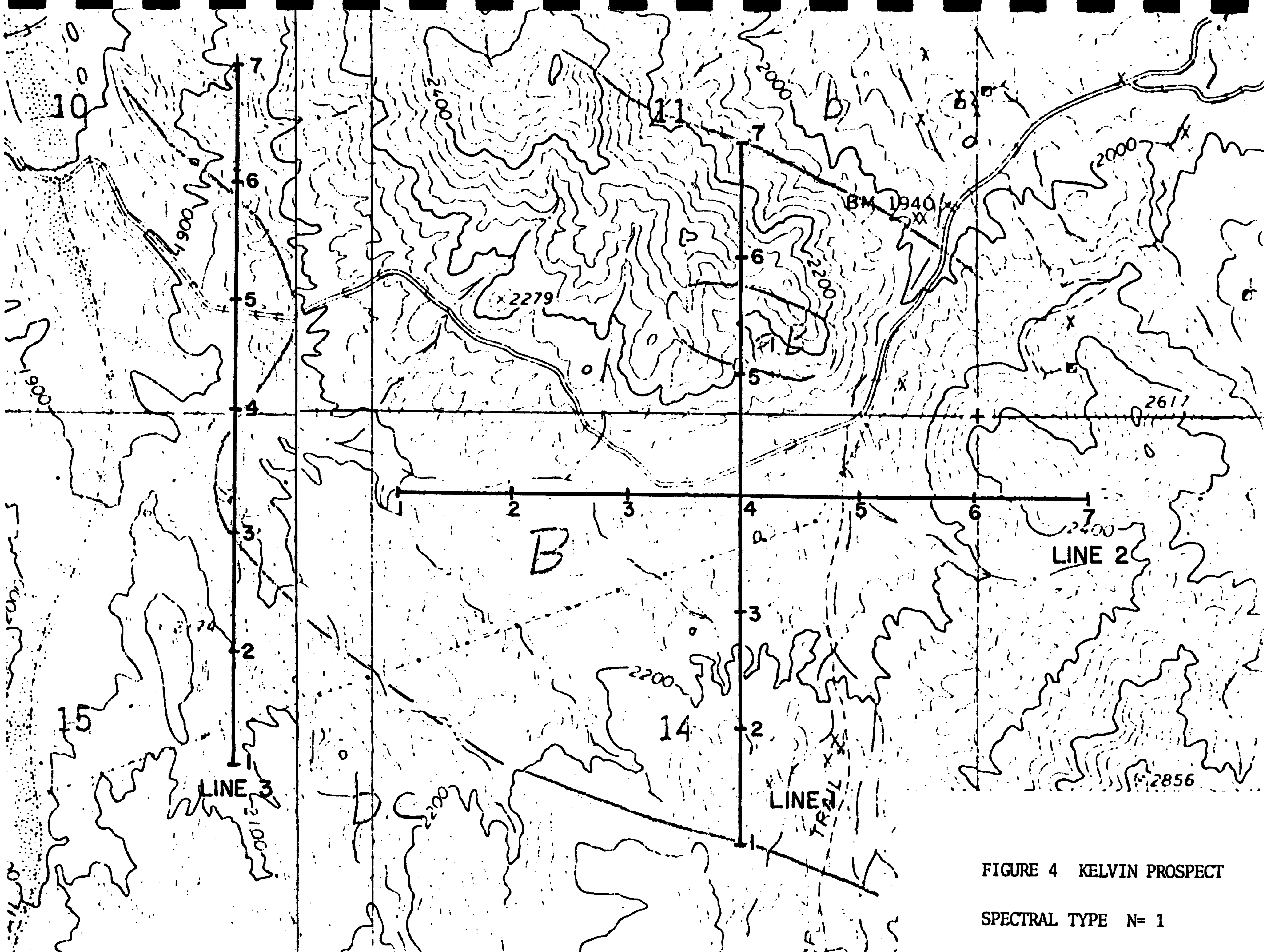


FIGURE 4 KELVIN PROSPECT

SPECTRAL TYPE N= 1

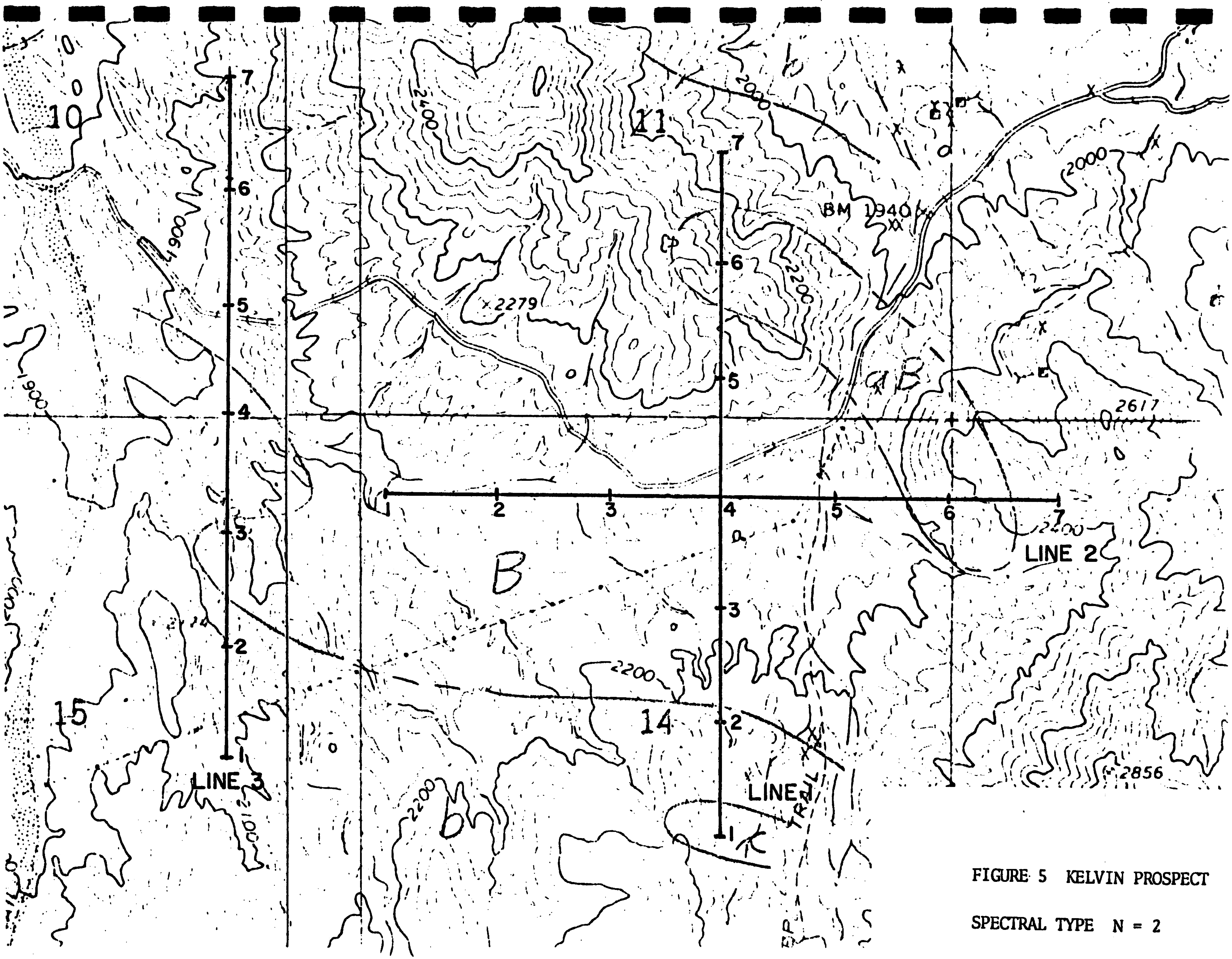


FIGURE 5 KELVIN PROSPECT

SPECTRAL TYPE N = 2

Line 1, N-S, 1000 ft. dipole-dipole:

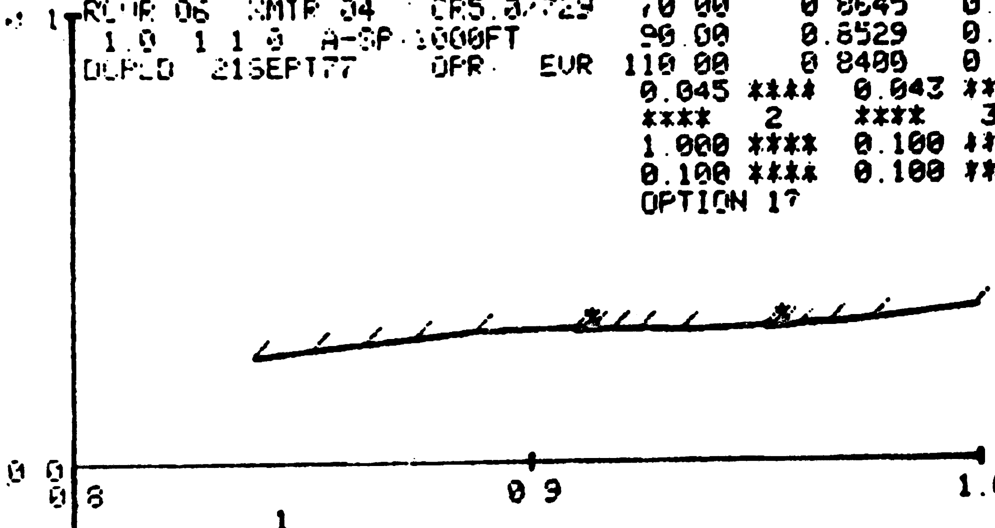
The apparent resistivity pseudosection shows a near-vertical resistive contact near station 5 which tends to display a steep southerly dip. The lower resistivity rock material to the south of this contact has a smoothly layered texture, gradually increasing in resistivity with depth.

The higher resistivity material to the north of station 5 appears to host most of the polarization response which is centered between stations 5 and 6. Background polarization values are quite high (10 mr) and appear to be due to alteration and a small amount of sulfides.

Spectral data do not provide any "textbook" py/cpy signatures although several spectra in the vicinity of stations 5 and 6 do display general characteristics of a pyrite/chalcopyrite environment. Most of these fall in the B or aB spectral type shown in the pseudosection in that area. The ab spectra at depth beneath stations 3 and 4 show signs of a combined low pyrite content and fairly strong alteration response. The strong alteration response seen in the data from beneath and to the north of the center of the line tends to overwhelm any mineralization response that might be there. Figure 6 is a near surface spectra which displays what we feel is a combination of a relatively strong alteration response with pyrite and a slight indication of chalcopyrite.

Coupling data supports the resistivity pseudosection in a general way. However, these data indicate a shallow layer of high resistivity material covering most of the surface (probably less than 200 feet thick) along this line. These data also indicate a high resistivity mass beneath stations 2 and 3. This feature probably accounts for some of the irregularity in the resistivity pseudosection, and could reverse the assumption of a steep southerly dip on the contact near station 5.

08/14/77 ZONGE ENGR & RSRCH 50.00 0.8752 0.0275
RCVR 06 XMTR 04 CRS.0/729 70 00 0 8645 0.0264
1.0 1 1 0 A-SP 1000FT 90.00 0.8529 0.0253
DLPLD 21SEPT77 OPR EVR 110 00 0 8400 0 0236
0.045 **** 0.043 **** 0 066 ****
**** 2 **** 3 **** 2
1.000 **** 0.100 **** 110.0
0.100 **** 0.100 **** 110 0
OPTION 1?



CORRECTED REAL AND IMAGINARY

0 10	1.0000	0 0342
0 30	0 9773	0.0312
0 50	0.9677	0 0305
0 70	0.9611	0.0301
0 90	0.9564	0.0295
1 10	0.9529	0.0295
1.00	0.9550	0.0299
3.00	0.9345	0.0291
5.00	0.9249	0.0294
7.00	0.9189	0.0292
9 00	0.9141	0.0292
11 00	0.9100	0.0291
19000	0.9124	0.0296
30.00	0.8888	0.0291

OPTION 2?
-1
RHOA= 546.0 OHM-METERS
.1HZ PHASE= 34.2 MILLIRADIANS
.1-1.HZ PFE= 4 7

RETRY?

FIGURE 6 KELVIN PROSPECT

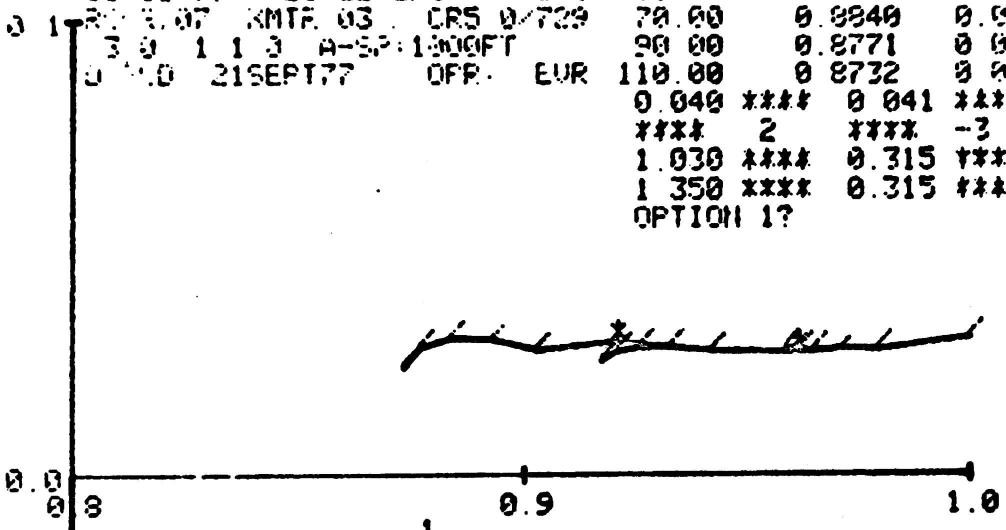
LINE 1. EXAMPLE OF ALTERATION, PYRITE, AND WEAK CHALCOPYRITE RESPONSE

<u>Line 2, E-W, 1000 ft. dipole-dipole</u>:

Apparent resistivity data display irregular surface resistivities (100 ohm-meters), and a general increasing trend with depth (500 ohm-meters). However, the coupling coefficient data show a relatively thin high resistivity surface layer to the west of station 4, and a low resistivity surface layer to the east. In general, the coupling data show a relatively complex conglomeration of resistivities with intermixed layered features on the western half of the line, and more of a lateral structure on the eastern half.

The background polarization (15 mr) on this line is somewhat higher than on Line 1 and again appears to be due to a strong alteration response. This effect is especially noticeable on the eastern half of the line. A buried tabular feature could cause the high polarization values seen beneath stations 5 and 6, and several spectra show signs of py/cpy in that vicinity. See Figure 2. These spectra are associated with the type aB responses beneath stations 5 and 6, and appear very similar to those seen between stations 5 and 6 on Line 1.

```
08 16 77   ZONGE ENGR & RSRCH  50.00    0.8933   0 0295
R? ?.07  XMTR 03 .  CRS 0/729  70.00    0.8840   0.0239
 3.0  1 1 3  A-SP:1000FT       90 00    0.8771   0 0277
? ?.0  21SEPT77    OFR.  EVR  110.00    0 8732   0 0235
                              0.040 ****  0 041 ****  0 045 ****
                              ****  2     ****  -3    ****   3
                              1.030 ****  0.315 ****  110 0
                              1 350 ****  0.315 ****  110 0
                              OPTION 1?
```



CORRECTED REAL AND IMAGINARY

0 10	1.0001	0.0299
0.30	0.9797	0.0273
0 50	0.9718	0.0277
0.70	0.9651	0.0270
0 90	0.9618	0.0269
1.10	0.9587	0.0275
1 00	0.9606	0.0267
3 00	0.9422	0 0271
5 00	0.9330	0.0280
7.00	0 9260	0.0278
9.00	0.9213	0.0270
11.00	0.9176	0.0250
10.00	0.9200	0.0269
30.00	0.9030	0.0273

```
OPTION 2?
-1
   RHOA=    480.3 OHM-METERS
 .1HZ PHASE=  29.9 MILLIRADIANS
 .1-1.HZ PFE=  4.1

RETRY?
```

FIGURE 7 KELVIN PROSPECT

LINE 2. COMBINED ALTERATION, PYRITE, AND POSSIBLE WEAK CHALCOPYRITE RESPONSE.

Line 3, N-S, 1000 ft. dipole-dipole:

Apparent resistivities along this line display the effects of variable surface resistivities and several lateral contacts. A low resistivity block (Gila Conglomerate?) is encountered near station 0 on the south end of the line, and appears to be at least 1000 feet thick. Another resistivity contact is located near station 5 with increasing resistivity values to the north. The high resistivity diagonal eminating from dipole 9-10 is probably a measurement artifact since this dipole spanned the river via a railroad bridge. However, little if any polarization effects are noticed.

A contact with polarizable material occurs near station 6 and is associated with the higher resistivity material on this end of the line. Several spectra on the north end show relatively strong alteration responses along with a hint at py/cpy content. See Figure 8. The relatively strong background polarization response (12 mr) is again attributed to alteration.

Coupling data generally supports the resistivity data, but in addition indicate a low resistivity cover on the north half of the line. Although data are limited on the southern portion, they tend to indicate that the thickness of the Gila Conglomerate is probably not much more than 1000 feet.

Kenneth L. Zonge

Arnold Ostrander

Van Reed

```
08/20/77   ZONGE ENGR & RSRCH  10.00    0.9338   0.0241
RCVR 09  XMTR 36   CRS 0/729   30.00    0.9156   0.0244
 2.0  3 1.0  A-SP 1000FT       50.00    0.9063   0.0229
DEPLD  23SEPT77    OPR:  EVR   70.00    0.9033   0.0214
                               90.00    0.9004   0.0248
                              110.00    0.8975   0.0240
                              0.033 ****  0.033 ****  0.035 ****
                              ****  3     ****  -3    ****  -3
                              2.240 ****  0.125 ****  110.0
                              2.200 ****  0.130 ****  110.0
                              OPTION 1?
```

3.1

0.0

0.8 0.9 1.0

1

CORRECTED REAL AND IMAGINARY

0.10	1.0000	0.0243
0.30	0.9831	0.0227
0.50	0.9764	0.0223
0.70	0.9709	0.0228
0.90	0.9677	0.0224
1.10	0.9641	0.0222
1.00	0.9666	0.0223
3.00	0.9511	0.0227
5.00	0.9433	0.0230
7.00	0.9392	0.0243
9.00	0.9353	0.0209
11.00	0.9316	0.0256

```
OPTION 2?
-1
   RHOA=     797.6 OHM-METERS
 .1HZ PHASE=  24.3 MILLIRADIANS
 .1-1.HZ PFE=  3.5

RETRY?
```

FIGURE 8 KELVIN PROSPECT

LINE 3. COMBINED ALTERATION, PYRITE, AND POSSIBLE WEAK CHALCOPYRITE RESPONSE.

DESCRIPTION OF COMPLEX RESISTIVITY FIELD MEASUREMENTS

Our geophysical data gathering and analysis technique is referred to as "Complex Resistivity" since the system measures both the amplitude and phase components of the received electrical signal. Data may be displayed in either complex number terms or amplitude and phase form, the only difference being a transformation between rectangular or polar coordinates. Amplitude and phase data are measured for a spectrum made up of discrete frequencies ranging from .01 Hz to 110 Hz. Graphically this spectrum is obtained by plotting the in-phase and out-of-phase or real and imaginary components of each frequency in the complex plane. This type of display is known as a Cole-Cole plot when referring to dielectric behavior or an Argand diagram in electrical circuit theory.

Data gathering with the Complex Resistivity (CR) system is done completely by a digital computer. The operator need only specify the frequency of the transmitted squarewave and adjust the gain on the receiver. All other operations are done automatically by the computer. Signals are received from the ground using a three electrode receiving dipole. This provides a differential input to the system which is used to facilitate common-mode noise rejection. The received signal is amplified, SP is removed and the signal is then passed through a low pass aliasing filter prior to digitization. Simultaneously the same analysis is performed on the output waveform from the computer-controlled transmitter.

The amplified and filtered signal next enters the computer where it is digitized by a 12 bit analog to digital converter. The present A/D system obtains 1024 sample points on each cycle of the incoming waveform. Successive cycles of the waveform are stacked by synchronously adding the set of 1024 sample points to a double-precision storage buffer in the computer. When the desired number of cycles has been completed the stack is divided by the number of cycles summed to obtain an average value for the waveform. The same technique is used to digitize the transmitted waveform.

This technique effectively removes random noise with the signal-to-noise ratio enhancement being proportional to the square root of the number of samples averaged. The existing CR system has effectively read through signal-to-noise ratios of less than 1/100.

At this stage, numerical representations of the averaged received and transmitted waveforms exist in the computer as digital, time domain voltage values. Next, a Fast Fourier Transform is performed on both. This mathematical transformation acts as a frequency filter and changes the representation of the two waveforms from time domain to frequency domain, resulting in a series of harmonics each having real and imaginary components. Since a periodic, symmetric squarewave has a zero value for all even frequency harmonics, we obtain a series of odd harmonics which now describe the original averaged waveform.

As soon as the FFT has been performed on both the received and transmitted waveforms, the resulting two sets of harmonics are deconvolved. This is done by dividing the received waveform by the transmitted waveform, on a harmonic by harmonic basis, using odd harmonics only.

Several reasons exist for deconvolving the system input and output waveforms. All systems which attempt to measure ground response to electrical stimulus, i.e. IP and CR, actually measure a combination of all of the voltages present. That is, the signal received by the CR system reflects more than just the effects of the ground transfer function. A major contributor to the received voltage is the stimulus itself, or the transmitted waveform, whose effect is convolved with the ground response in the received signal. Removing that factor from the data leaves only the ground response plus noise, which hopefully has been removed to such an extent as to be very small or unnoticeable. Deconvolution also removes the effects of filtering and any other sources of amplitude change or phase shift in the receiving system, as long as identical channels are used. The result then is a clearer picture of the induced polarization effects.

The final acquisition step includes displaying the data on the teletype and recording it on cassette tape. Three fundamental frequencies are normally used in the field: 10.0, 1.0. 0.1 Hz. The non-zero harmonic numbers calculated for any fundamental frequency are 1, 3, 5, 7, 9 and 11. Expanding the harmonics for each transmitted fundamental, a discrete spectrum from 0.1 to 110 Hz is obtained. Occasionally a .01 Hz fundamental is used to extend the spectra one decade lower for areas where low frequency alteration characteristics become evident.

Nearly all field data contain some degree of electromagnetic and/or cultural coupling, especially at frequencies above 10 Hz. Therefore, these data are further reduced in the office by processing them through an iterative computer routine which removes EM coupling effects and as much of the cultural coupling effects as possible. In addition, all spectra are normalized to the magnitude of the lowest frequency measured.

The decoupled spectra are then automatically plotted in the complex plane with the horizontal axis being the positive real and the vertical axis the negative imaginary. This quadrant is where the majority of the spectra fall. Spectra are then examined for traits and behavior that have been found empirically to be of significance from the study of rock sample measurements and field surveys confirmed by drill holes.

All reduced data are then summarized and plotted in the conventional pseudo-section form. Apparent resistivities, percent frequency effects and phase angles at 0.1 Hz (which are equivalent to time-domain chargeability) are obtained from the field data using conventional techniques. Therefore, the results of each survey are first presented in conventional form using pseudosection plots of apparent resistivity (ρa) in ohm-meters, 0.1 to 1.0 Hz decade percent frequency effect (PFE), and phase angle at 0.1 Hz ($\phi_{.1}$) in milliradians, and then analyzed for spectral characteristics.

Apparent mineralization, host rock type response, EM coupling data and other parameters derived from the CR process are presented in pseudosection form when appropriate. EM coupling data are analyzed in an effort to obtain additional data on geologic structure and as an aid in apparent resistivity pseudosection interpretation.

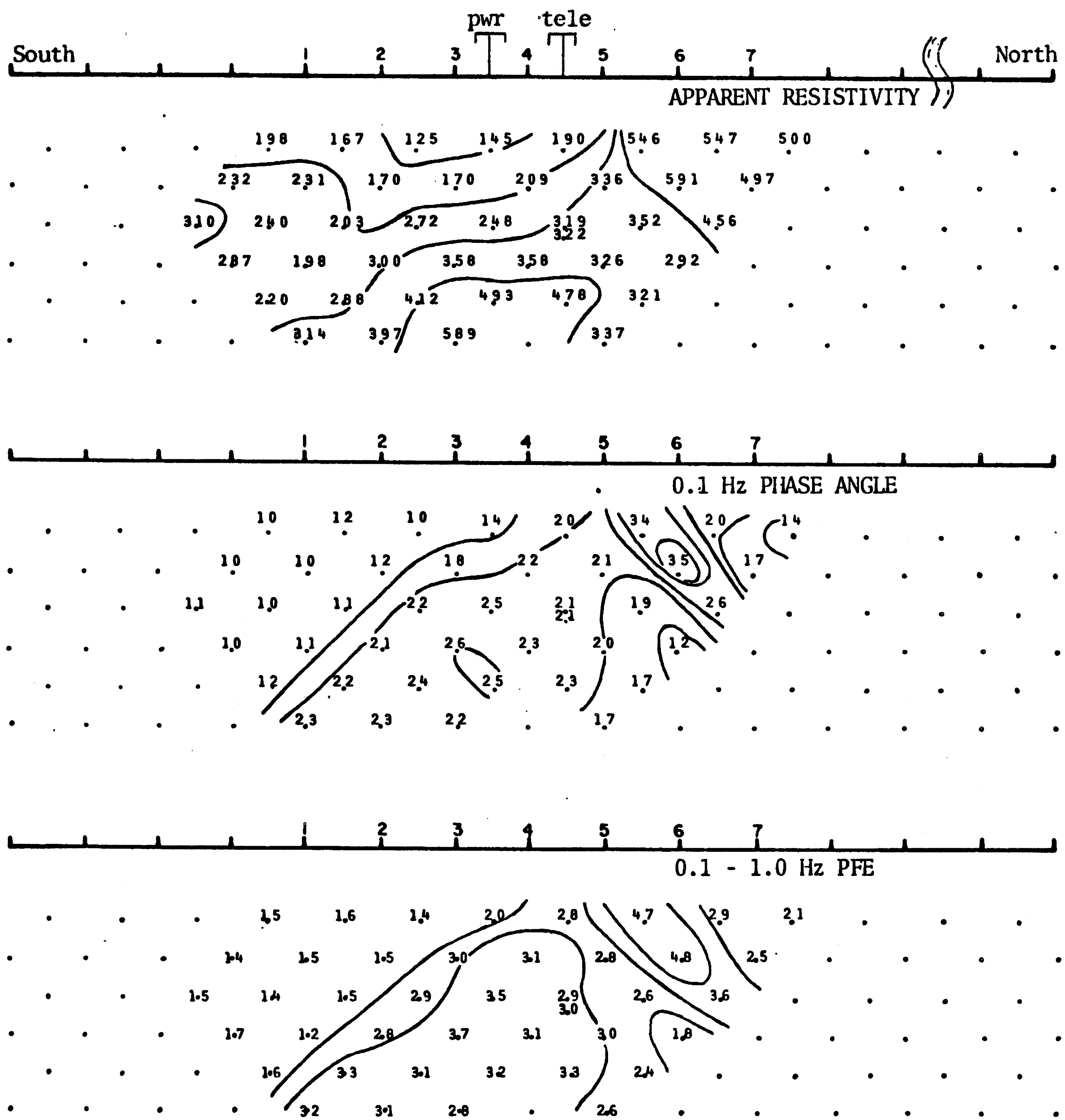
Qualitative analyses are obtained for spectral and mineralization responses and quantitative results are possible when the mineralization response is relatively strong. Basic spectral responses have been grouped into three general categories: Type A, decreasing out-of-phase response with increasing frequency - usually associated with strong alteration, sulfide mineralization including pyrite, graphite and some clays; Type B, constant out-of-phase response with increasing frequency - has been associated with low pyrite/mixed mineral environments and transition zones between Type A and C environments; Type C, increasing out-of-phase response with increasing frequency - usually associated with weak alteration such as chloritization, and does not usually host sulfides.

Subsurface lithology can often be mapped electrically when differing rock types have their own spectral characteristics, regardless of their respective resistivities. This is especially useful in mapping new areas and indirectly searching for deposits such as uranium, coal and geothermal sources.

EM coupling data are furnished when they aid in the overall interpretation of complex resistivity results. The data are presented in two forms: reflection coefficient and residual EM. The reflection (or coupling) coefficient is a multi-frequency measure of layered inhomogeneaties with a value of unity (1.0) indicating an apparent homogeneous earth response. In its simplest interpretation, positive reflections (reflection coefficient greater than 1.0) indicate a two layer earth with the uppermost resistivity less than the lower resistivity. Negative reflections (reflection coefficient less than 1.0) indicate the reverse resistivity structure.

Single frequency deviations from a homogeneous earth EM response are currently being investigated and used to probe deeper than standard resistivity soundings and to aid in subsurface structure determination when normal resistivity techniques are confusing or inadequate. These data are plotted as conventional EM profiles or in pseudosection form as in-phase and out-of-phase components.

This residual EM approach is currently being refined as a new exploration tool. Results to date on dipole-dipole surveys indicate that this technique is sensitive to resistivity or lithologic changes which cannot be seen in standard IP or resistivity data. Also, the depth of penetration, which is frequency dependent, is greater for this type of analysis than standard low frequency resistivity techniques. However, much more modeling remains to be done on our part before this technique can be fully exploited.



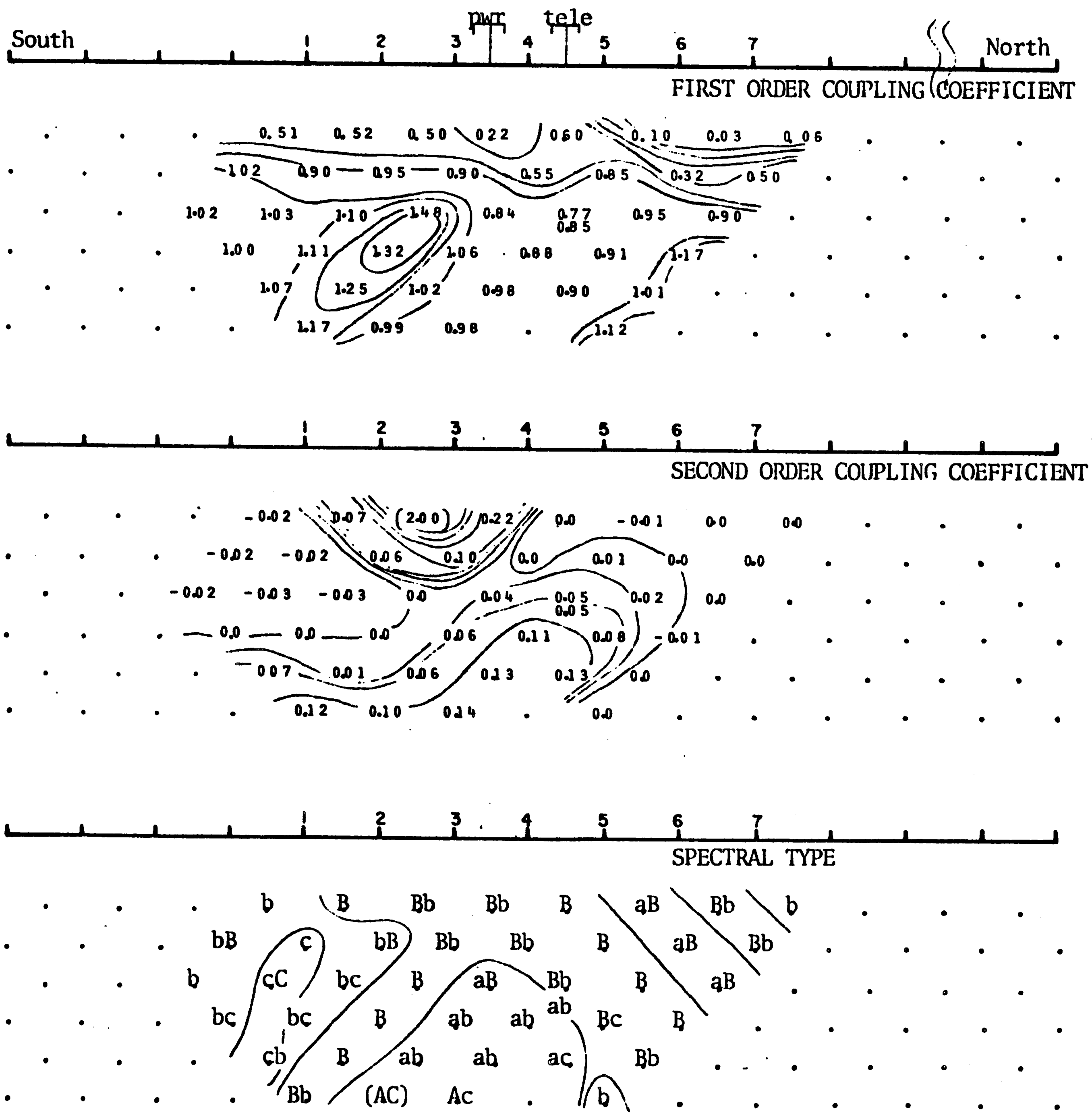
ZONGE
ENGINEERING
COMPLEX
RESISTIVITY

Kerr-McGee - Gulf Mineral
Kelvin Properties

LINE 1
SPACING a = 1000'
DATE 11 August 1977
PAGE 1 **OF** 2

LEGEND:
- FENCE
- PIPELINE
- POWERLINE
- ROAD

CP



ZONGE
ENGINEERING
COMPLEX
RESISTIVITY

Kerr-McGee - Gulf Mineral
Kelvin Properties

LINE 1
SPACING a = 1000'
DATE 11 August 1977
PAGE 2 **OF** 2

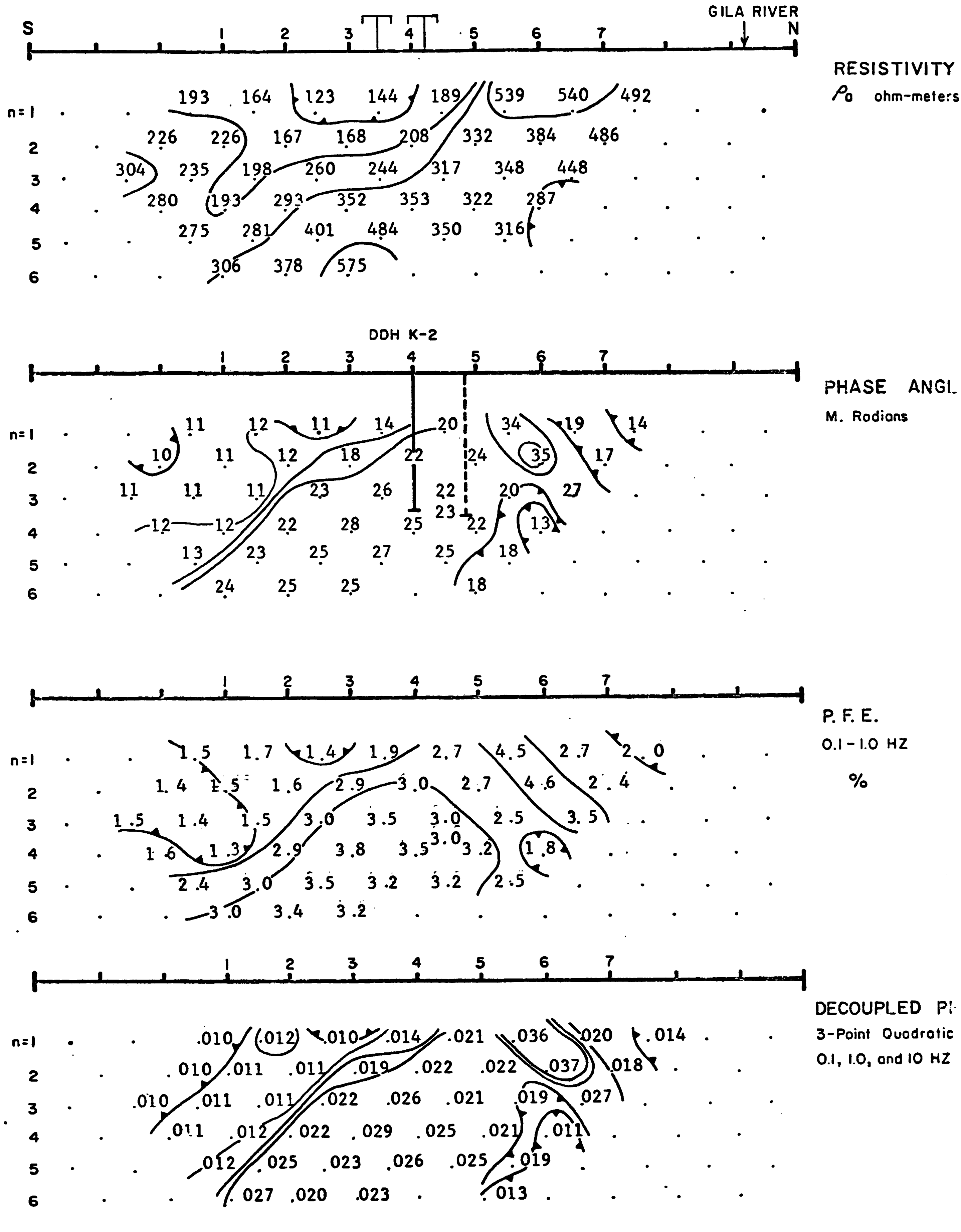
LEGEND:

- FENCE
- PIPELINE
- POWERLINE
- ROAD

CO

KELVIN PROJECT
PINAL COUTY, ARIZONA

LINE 1



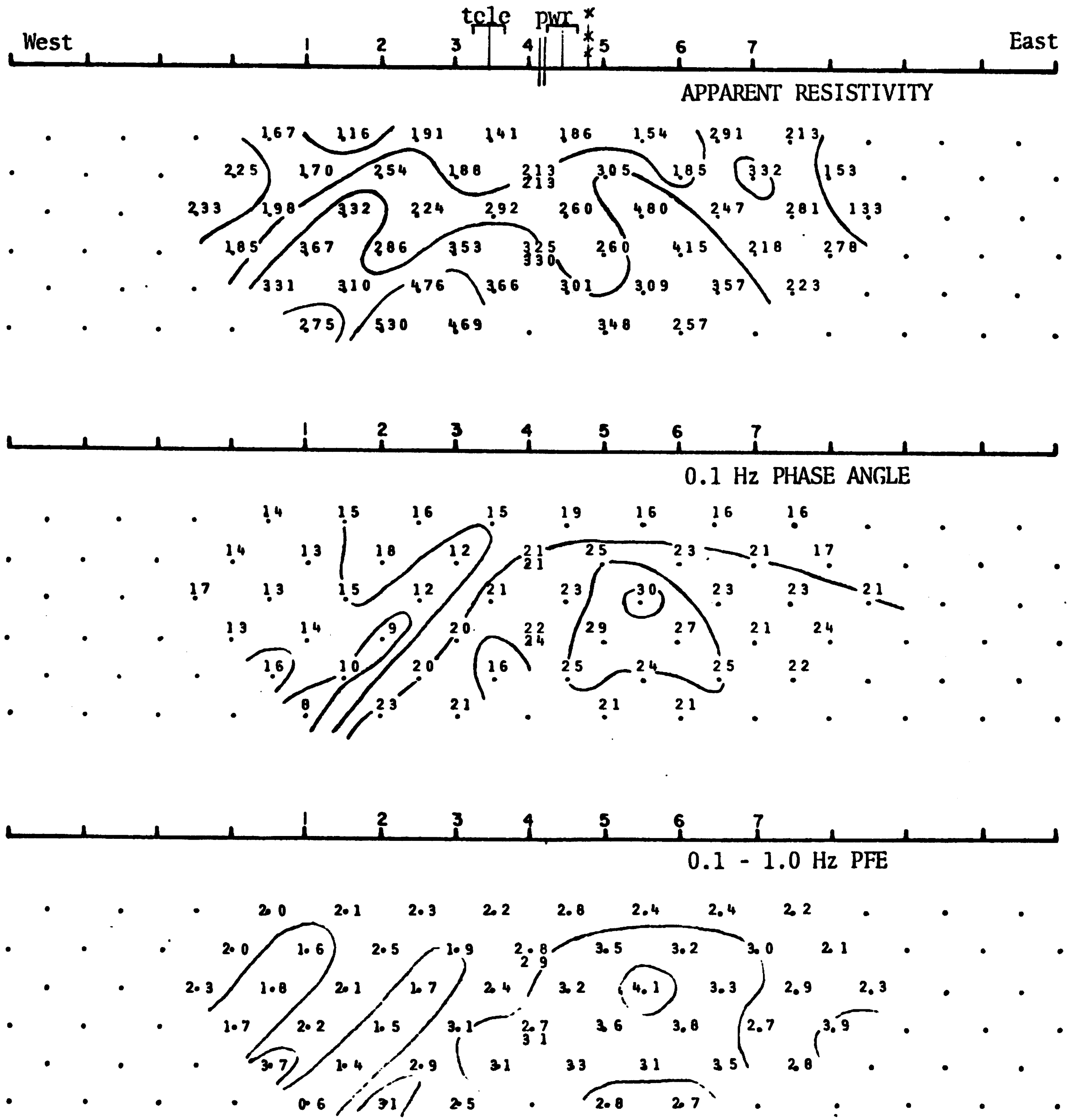
Z. E. 1

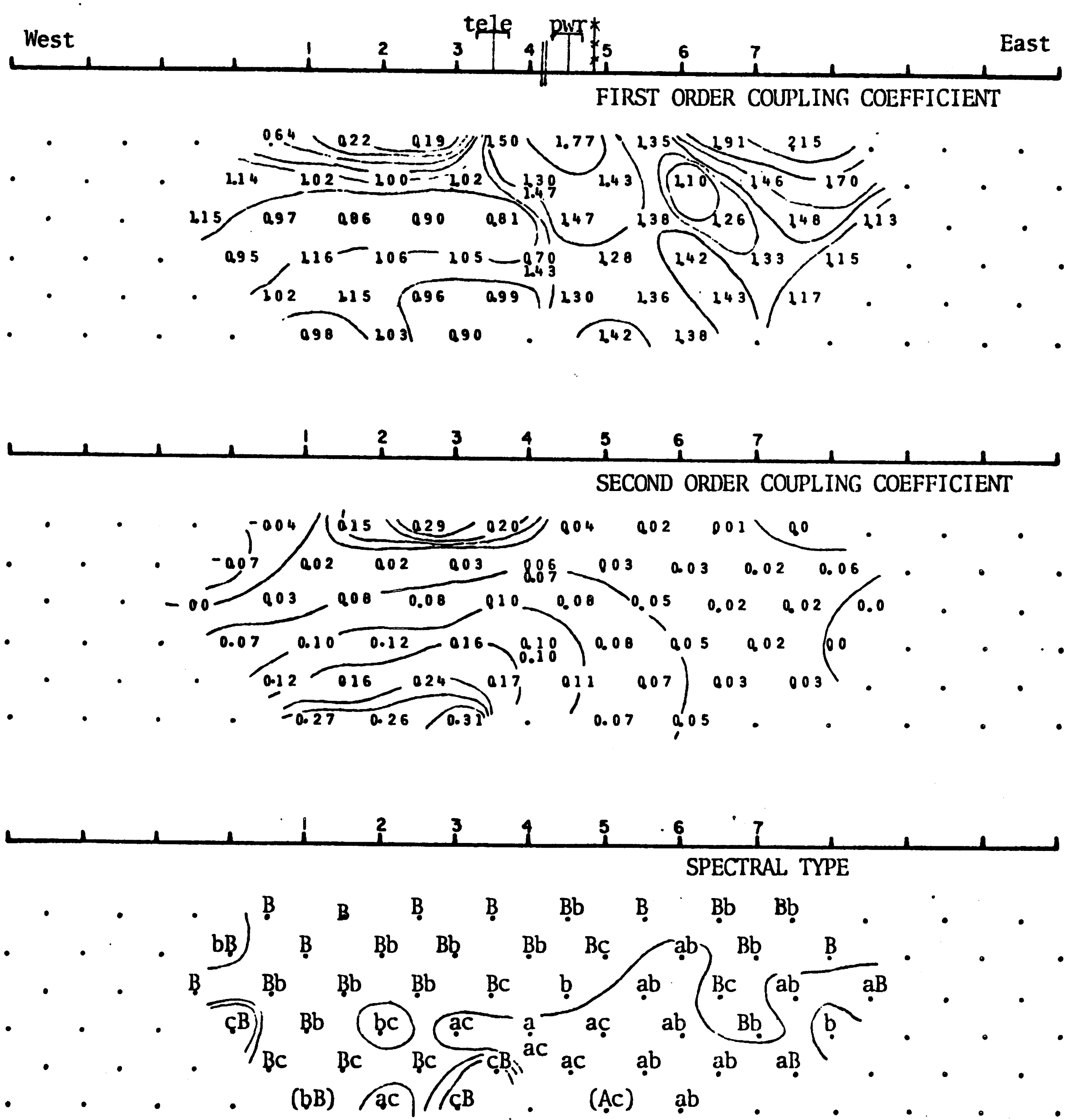
ZONGE ENGINEERING
COMPLEX RESISTIVITY

Kerr-McGee/Gulf Minerals
Kelvin Properties

LINE 2
SPACING a = 1000'
DATE 15 August 1977
PAGE 1 **OF** 2

LEGEND:
- FENCE
- PIPELINE
- POWERLINE
- ROAD





ZONGE ENGINEERING

COMPLEX RESISTIVITY

Kerr-McGee/Gulf Minerals

Kelvin Properties

LINE 2

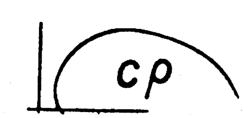
SPACING a = 1000'

DATE 15 August 1977

PAGE 2 **OF** 2

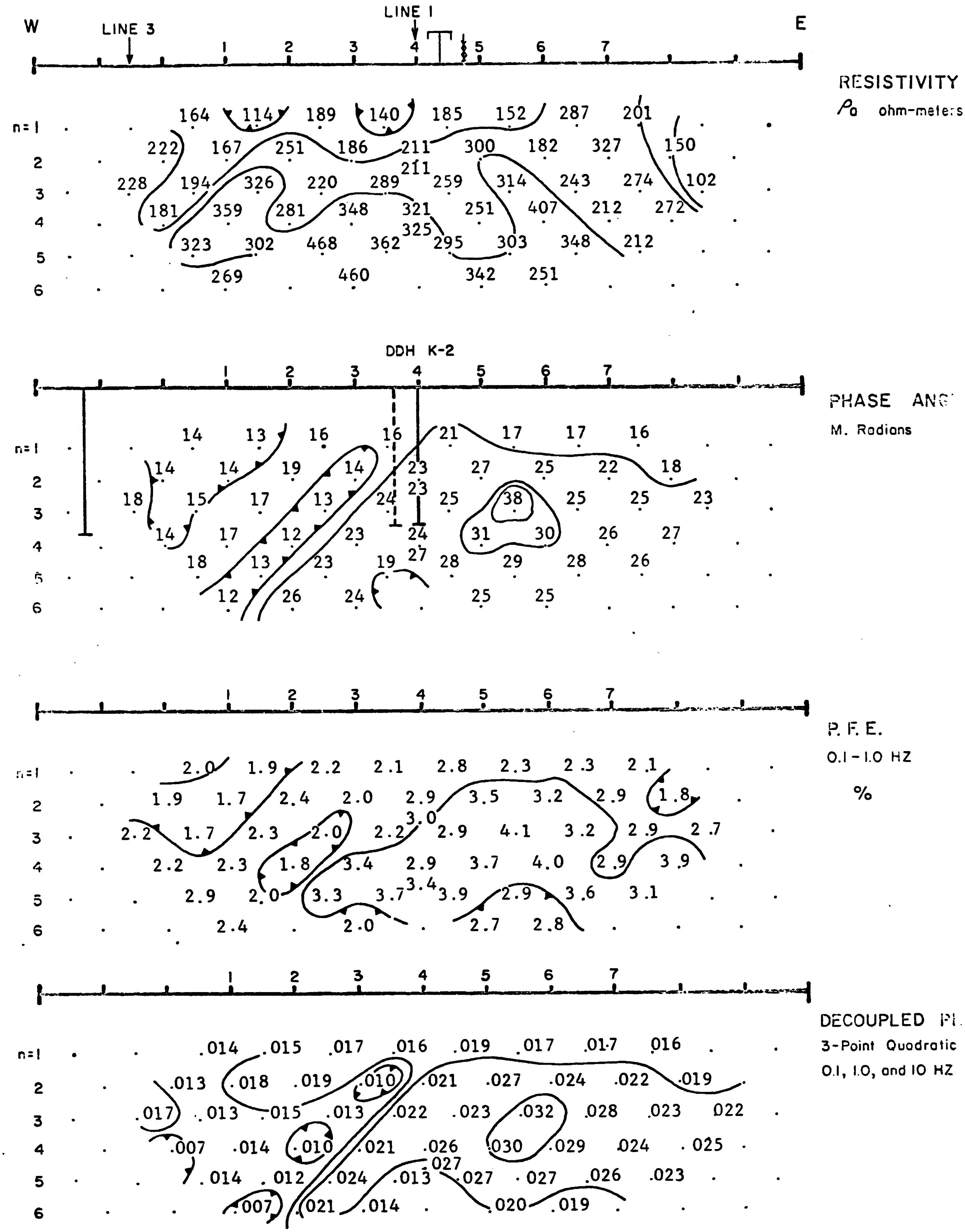
LEGEND:

- FENCE
- PIPELINE
- POWERLINE
- ROAD



KELVIN PROJECT
PINAL COUTY, ARIZONA

LINE 2



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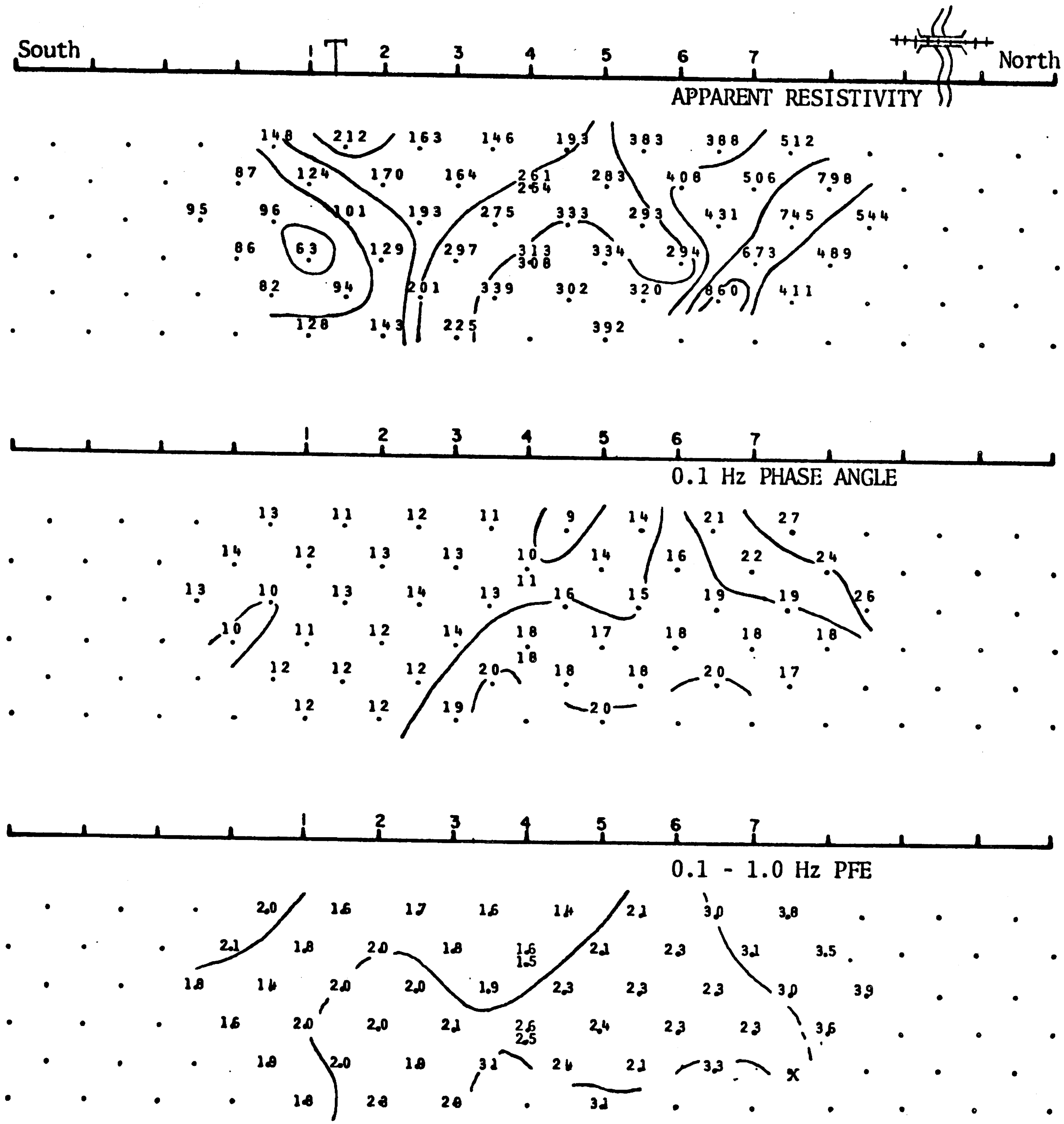


ZONGE
ENGINEERING
COMPLEX
RESISTIVITY

Kerr-McGee - Gulf Minera
Kelvin Properties

LINE 3
SPACING a = 1000'
DATE 19 August 1977
PAGE 1 **OF** 2

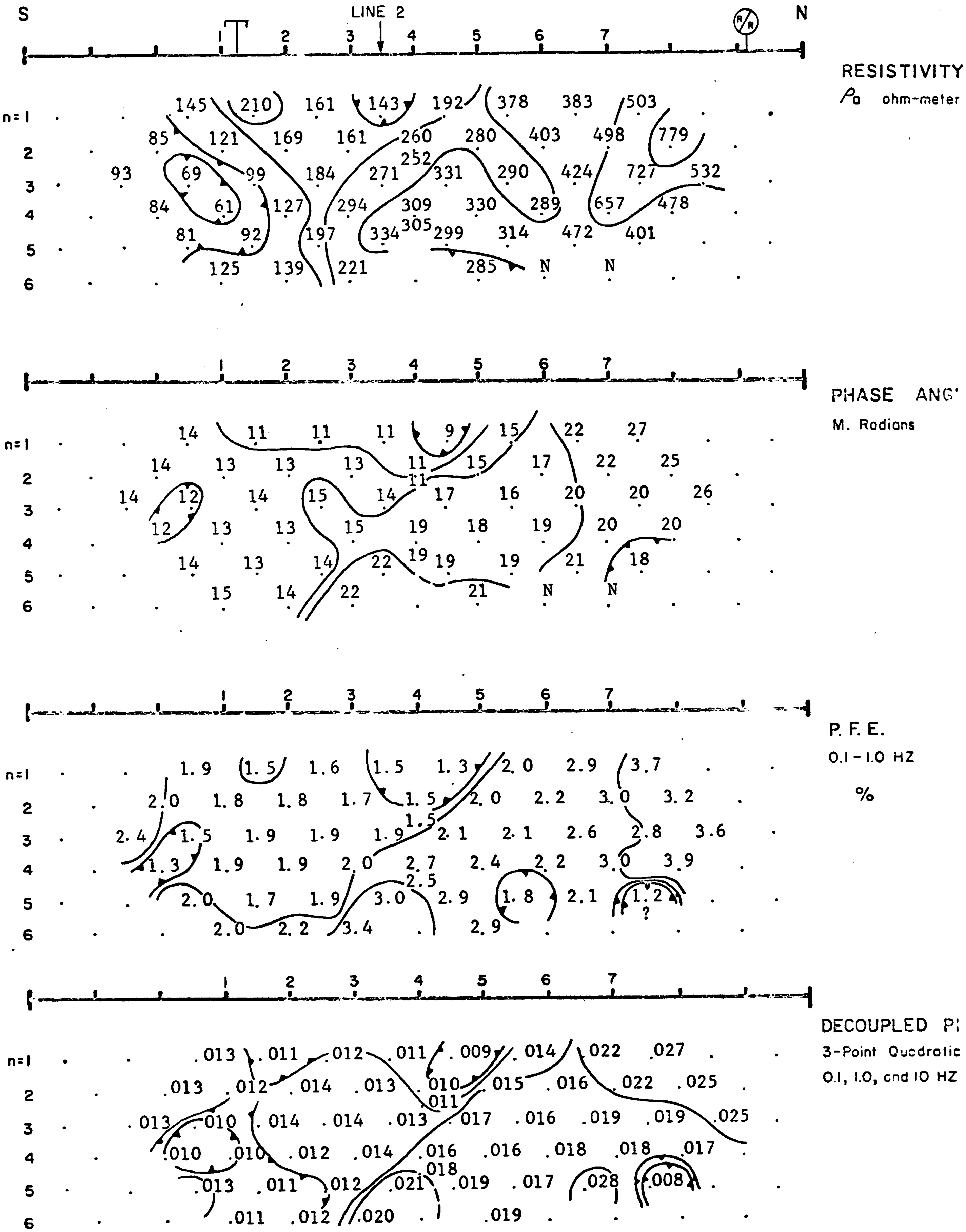
LEGEND:

- FENCE
- PIPELINE
- POWERLINE
- ROAD

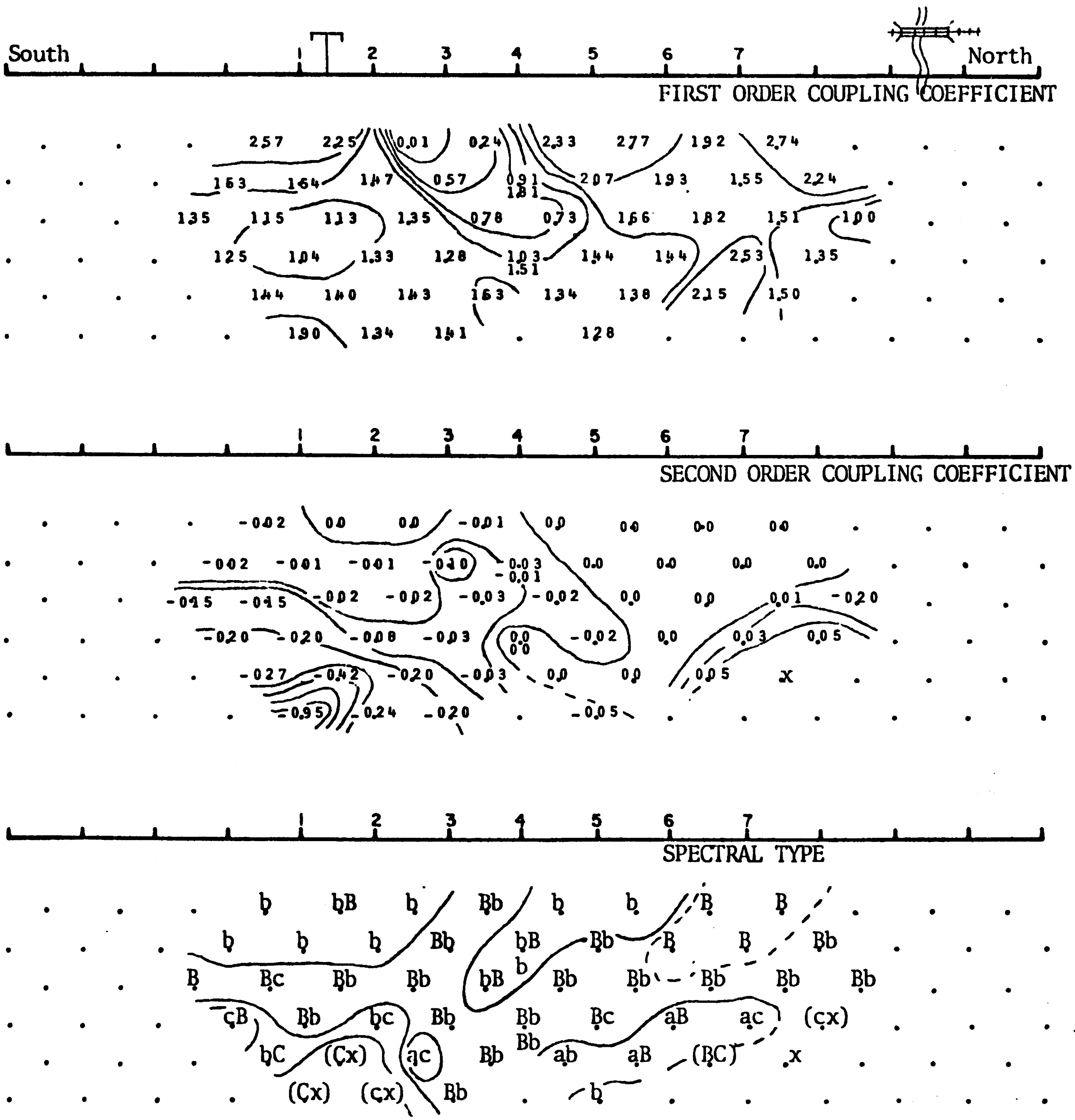
CO

KELVIN PROJECT
PINAL COUTY, ARIZONA

LINE 3



Z. E.



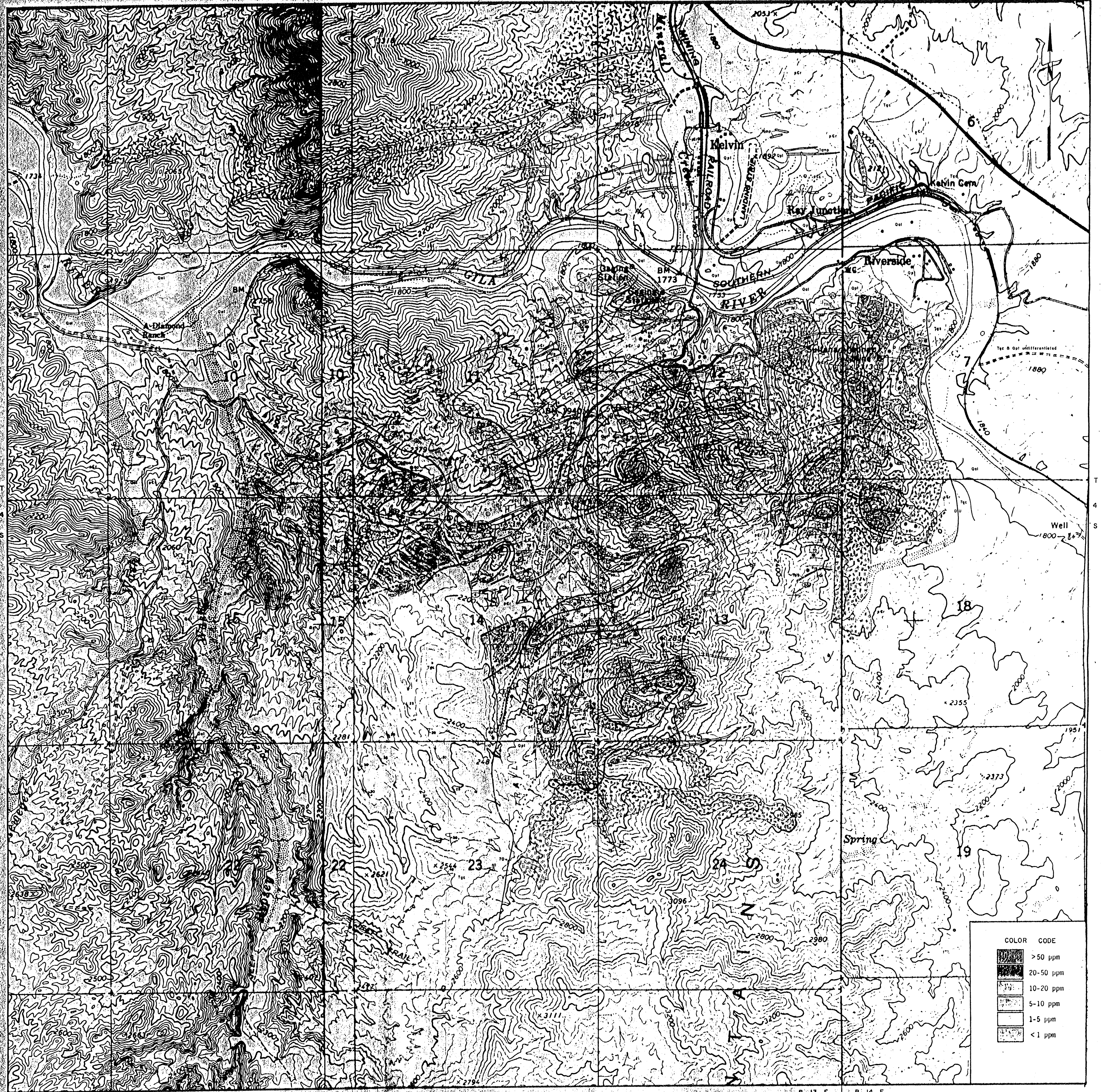
ZONGE
ENGINEERING
COMPLEX
RESISTIVITY

Kerr-McGee - Gulf Mineral:
Kelvin Properties

LINE 3
SPACING a = 1000'
DATE 19 August 1977
PAGE 2 **OF** 2

LEGEND:

- FENCE
- PIPELINE
- POWERLINE
- ROAD



EXPLANATION

LITHOLOGY

QUATERNARY

Qal

Alluvium, sand, gravel, and boulders

Qpt

Pediment and river gravels and talus undifferentiated

——————ANGULAR UNCONFORMITY——————

TERTIARY

Tgc

Gila conglomerate
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method).

LARAMIDE — Paleocene

Tfm

Teapot Mountain monzonite

Tibx

Intrusion breccia
Round to angular fragments of Paleozoic limestones Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuated and recrystallized diabase groundmass

Tbx

Crackle breccia
Ruin granite showing round to angular fragments with minor diabase

Tqlp

Quartz latite porphyry dike

Thlp

Hornblende latite porphyry dike

Tqm | Tqmp

Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

LARAMIDE — Late Cretaceous

Thmp

Hornblende monzonite porphyry

Td

Tortilla quartz diorite

PRECAMBRIAN

db

Diabase

pЄr

Ruin granite, aplitic facies stippled

STRUCTURE

Strike and dip of beds

Contact
Dashed where approximated; dotted where concealed

Fault
Showing dip; dashed where approximated; dotted where concealed

Fault breccia and gouge

inclined subvertical vertical

Joint set
Continuous, planar J_1-set showing direction and amount of dip; (20), designates the number of J_1-surfaces encountered in a 10ft. traverse taken normal to joint set

ALTERATION

Quartz-pyrite vein
showing direction and amount of dip
Quartz-pyrite vein or joint coating containing the following accessory minerals: sericite, calcite, chlorite, o epidote, ✱ black tourmaline rosette, ◇ specularite, ● magnetite

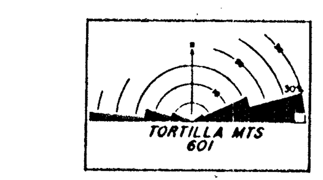
MISCELLANEOUS

Geochemical rock-chip traverse

Geochemical rock-chip sample of vein

Drill hole location

LARAMIDE STRIKE ROSETTE



601-1,000ft. strike segments of mineralized Laramide structures and dikes

FIGURE 17 Contoured geochemical distribution of combined gold-silver (ppm) in selected vein and fault-vein samples

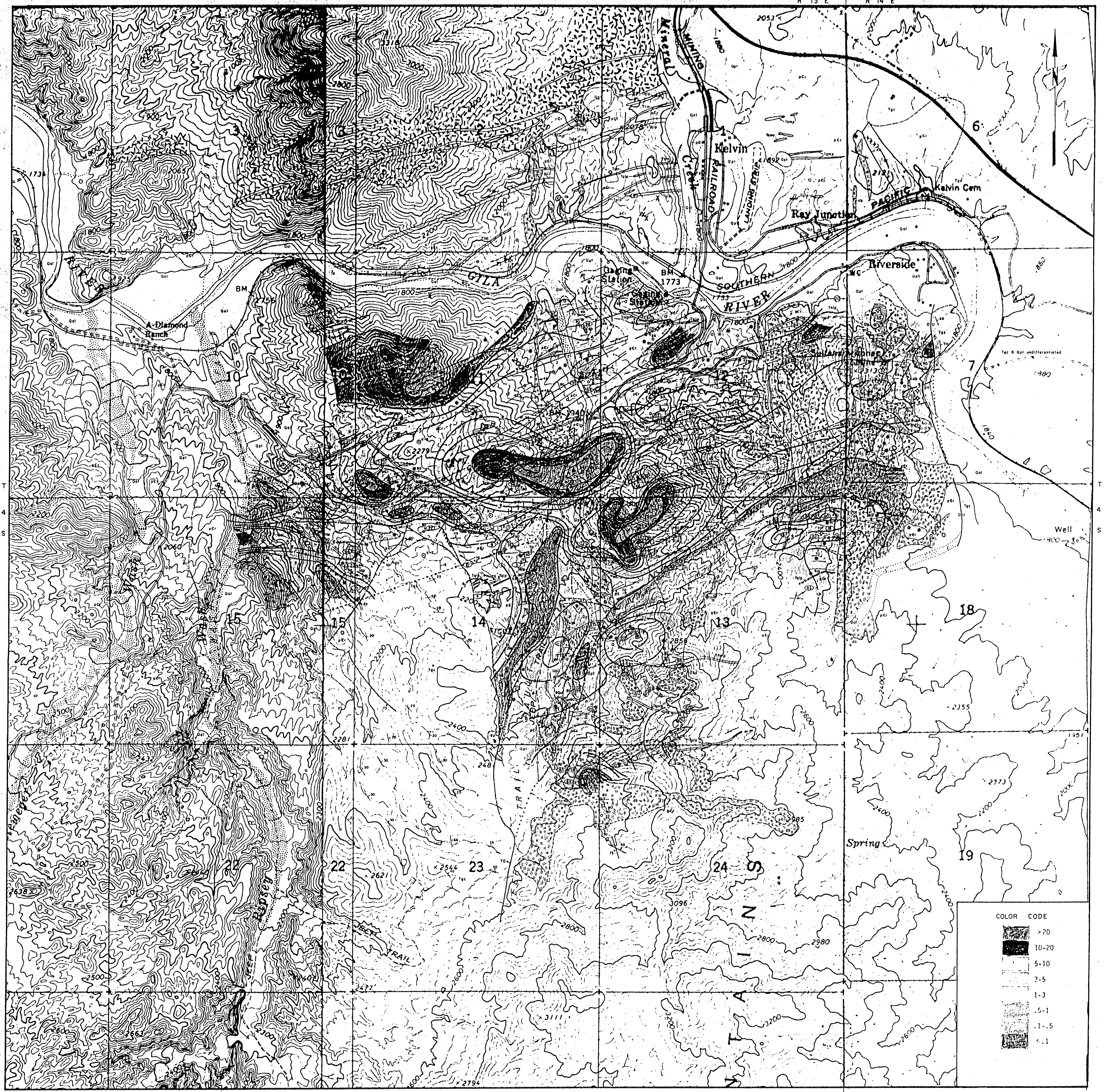
0 1000 2000 3000
Scale in feet

DETAILED GEOLOGIC MAP OF THE
RIVERSIDE (KELVIN) DISTRICT
PINAL COUNTY, ARIZONA

Gulf Mineral Resources Co.

BY: J. Wilkins, T.L. Heidrick, G.R. Wessel
DRWN. BY: K.A.C.

PROJ. NO. TAO 77-22
DATE: Oct. 1977



EXPLANATION

LITHOLOGY

QUATERNARY

Qal — Alluvium, sand, gravel, and boulders

Qpt — Pediment and river gravels and talus undifferentiated

----- ANGULAR UNCONFORMITY -----

TERTIARY

Tgc — Gila conglomerate
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method).

LARAMIDE — Paleocene

Ttm — Teapot Mountain monzonite

Tibx — Intrusion breccia
Round to angular fragments of Paleozoic limestones, Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuated and recrystallized diabase groundmass

Tbx — Crackle breccia
Ruin granite showing round to angular fragments with minor diabase

Tqlp — Quartz latite porphyry dike

Thlp — Hornblende latite porphyry dike

Tqm | Tqmp — Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

LARAMIDE — Late Cretaceous

Thmp — Hornblende monzonite porphyry

Td — Tortilla quartz diorite

PRECAMBRIAN

db — Diabase

p€r — Ruin granite, aplitic facies stippled

STRUCTURE

Strike and dip of beds

Contact
Dashed where approximated; dotted where concealed

Fault
Showing dip; dashed where approximated; dotted where concealed

Fault breccia and gouge

inclined subvertical vertical

Joint set
Continuous, planar J_1-set showing direction and amount of dip;
(20), designates the number of J_1-surfaces encountered in a 10ft. traverse taken normal to joint set

ALTERATION

Quartz-pyrite vein
showing direction and amount of dip
Quartz-pyrite vein or joint coating containing the following accessory minerals:
sericite, calcite, chlorite, o epidote, black tourmaline rosette, speculorite, magnetite

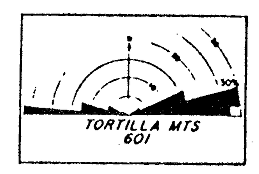
MISCELLANEOUS

Geochemical rock-chip traverse

Geochemical rock-chip sample of vein

Drill hole location

LARAMIDE STRIKE ROSETTE



601-1,000ft. strike segments of mineralized Laramide structures and dikes

FIGURE 16 Contoured $\frac{Mo \times 10}{Pb}$ ratio in selected vein and fault-vein samples

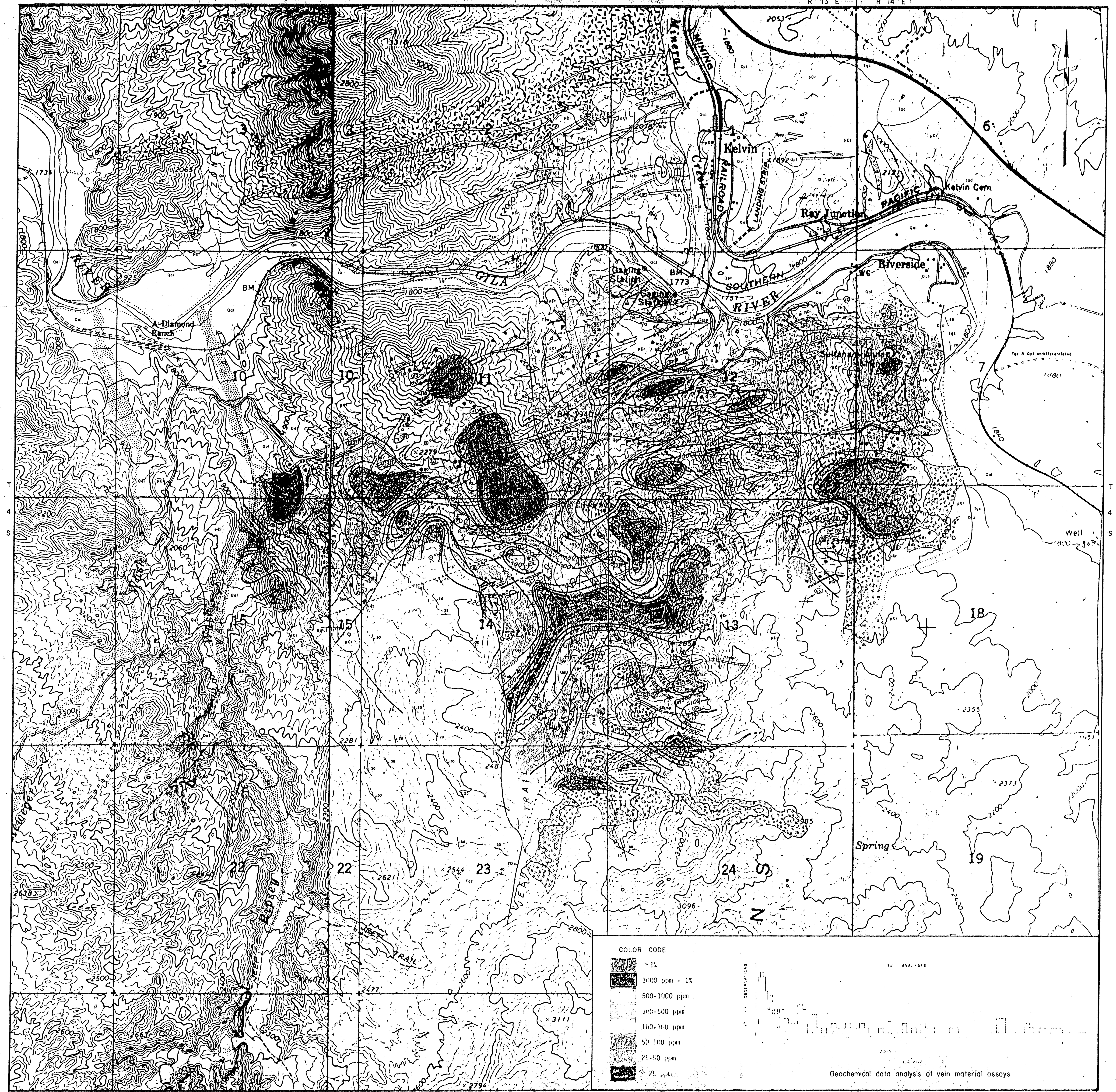
0 1000 2000 3000
Scale in feet

DETAILED GEOLOGIC MAP OF THE RIVERSIDE (KELVIN) DISTRICT

PINAL COUNTY, ARIZONA

Gulf Mineral Resources Co.

BY: J. Wilkins, T.L. Heidrick, G.R. Wessel PROJ. NO. TAO 77-22
DRWN. BY: K.A.C. DATE: Oct. 1977



EXPLANATION

LITHOLOGY

QUATERNARY

Qal. — Alluvium, sand, gravel, and boulders

Qpt — Pediment and river gravels and talus undifferentiated

--------ANGULAR UNCONFORMITY--------

TERTIARY

Tgc — Gila conglomerate
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method).

LARAMIDE — Paleocene

Ttm — Teapot Mountain monzonite

Tibx — Intrusion breccia
Round to angular fragments of Paleozoic limestones Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuated and recrystallized diabase groundmass

Tbx — Crackle breccia
Ruin granite showing round to angular fragments with minor diabase

Tqlp — Quartz latite porphyry dike

Thlp — Hornblende latite porphyry dike

Tqm | Tqmp — Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

Late Cretaceous

Thmp — Hornblende monzonite porphyry

Td — Tortilla quartz diorite

PRECAMBRIAN

db — Diabase

p€r — Ruin granite, aplitic facies stippled

STRUCTURE

Strike and dip of beds

Contact
Dashed where approximated, dotted where concealed

Fault
Showing dip, dashed where approximated; dotted where concealed

Fault breccia and gouge

inclined 63 · subvertical 20 · vertical

Joint set
Continuous, planar J_1-set showing direction and amount of dip;
(20), designates the number of J_1-surfaces encountered in a 10ft. traverse taken normal to joint set

ALTERATION

Quartz-pyrite vein
showing direction and amount of dip
Quartz-pyrite vein or joint coating containing the following accessory minerals:
sericite, calcite, chlorite, o epidote, black tourmaline rosette, ◇ specularite, ● magnetite

MISCELLANEOUS

Geochemical rock-chip traverse

Geochemical rock-chip sample of vein

Drill hole location

LARAMIDE STRIKE ROSETTE

TORTILLA MTS
601

601-1,000ft. strike segments of mineralized Laramide structures and dikes

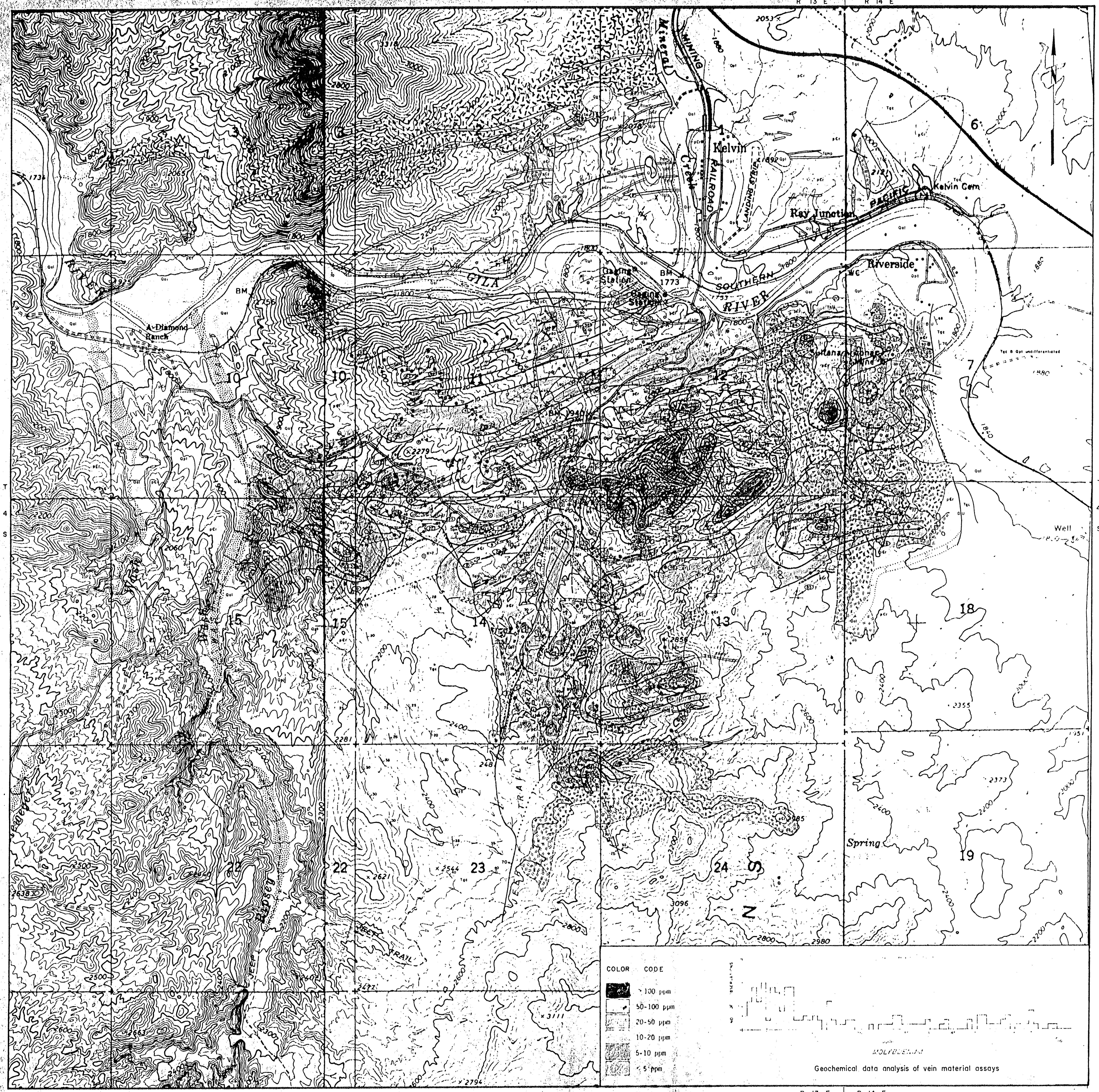
FIGURE 14 Contoured geochemical distribution of lead (ppm) in selected vein and fault-vein samples

0 1000 2000 3000
Scale in feet

DETAILED GEOLOGIC MAP OF THE
RIVERSIDE (KELVIN) DISTRICT
PINAL COUNTY, ARIZONA

Gulf Mineral Resources Co.

BY: J. Wilkins, T.L. Heidrick, G.R. Wessel — PROJ. NO. TAO 77-22
DRWN. BY: K.A.C. — DATE: Oct. 1977



EXPLANATION

LITHOLOGY

QUATERNARY

Qal — Alluvium, sand, gravel, and boulders

Qpt — Pediment and river gravels and talus undifferentiated

--------*ANGULAR UNCONFORMITY*--------

TERTIARY

Tgc — **Gila conglomerate**
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method)

LARAMIDE — Paleocene

Ttm — Teapot Mountain monzonite

Tibx — **Intrusion breccia**
Round to angular fragments of Paleozoic limestones, Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuated and recrystallized diabase groundmass

Tbx — **Crackle breccia**
Ruin granite showing round to angular fragments with minor diabase

Tqlp — Quartz latite porphyry dike

Thlp — Hornblende latite porphyry dike

Tqm | Tqmp — Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

Late Cretaceous

Thmp — Hornblende monzonite porphyry

Td — Tortilla quartz diorite

PRECAMBRIAN

db — Diabase

p€r — Ruin granite, aplitic facies stippled

STRUCTURE

Strike and dip of beds

Contact
Dashed where approximated, dotted where concealed

Fault
Showing dip, dashed where approximated; dotted where concealed

Fault breccia and gouge

inclined — subvertical — vertical

Joint set
Continuous, planar J_1-set showing direction and amount of dip;
(29), designates the number of J_1-surfaces encountered in a 10ft traverse taken normal to joint set

ALTERATION

Quartz-pyrite vein
showing direction and amount of dip
Quartz-pyrite vein or joint coating containing the following accessory minerals:
sericite, calcite, chlorite, o epidote, black tourmaline rosette, speculorite, • magnetite

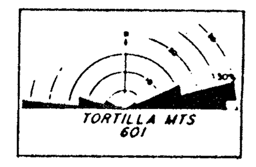
MISCELLANEOUS

Geochemical rock-chip traverse

Geochemical rock-chip sample of vein

Drill hole location

LARAMIDE STRIKE ROSETTE



601-1,000ft. strike segments of mineralized Laramide structures and dikes

FIGURE 13 Contoured geochemical distribution of molybdenum (ppm) in selected vein and fault-vein samples

0 1000 2000 3000
Scale in feet

DETAILED GEOLOGIC MAP OF THE RIVERSIDE (KELVIN) DISTRICT

PINAL COUNTY, ARIZONA

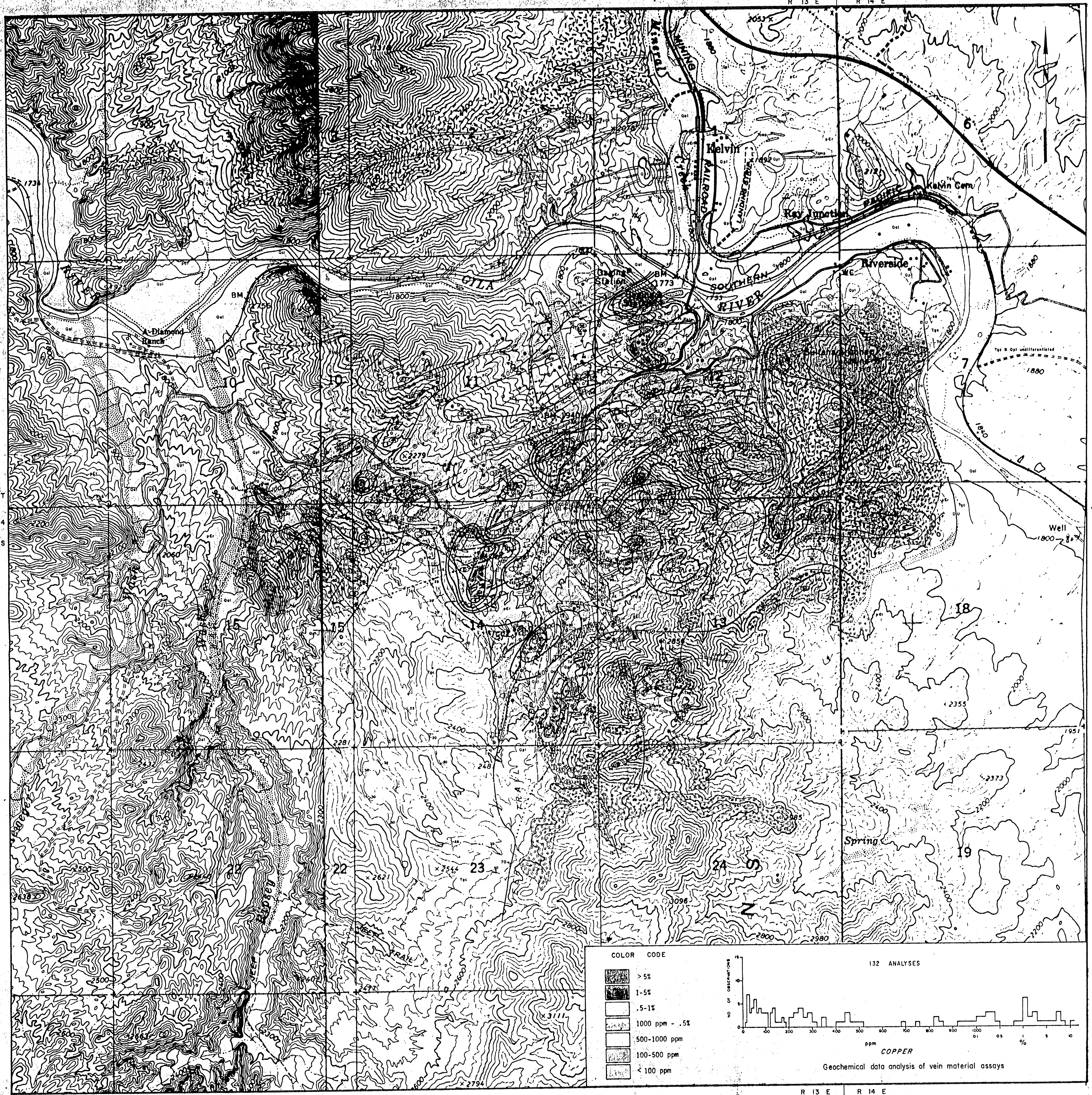
Gulf Mineral Resources Co.

BY: J. Wilkins, T.L. Heidrick, G.R. Wessel

PROJ. NO. TAO 77-22

DRWN. BY: K.A.C.

DATE: Oct. 1977



EXPLANATION

LITHOLOGY

QUATERNARY

Qal — Alluvium, sand, gravel, and boulders

Qpt — Pediment and river gravels and talus undifferentiated

———ANGULAR UNCONFORMITY———

TERTIARY

Tgc — Gila conglomerate
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method)

LARAMIDE — Paleocene

Ttm — Teapot Mountain monzonite

Tibx — Intrusion breccia
Round to angular fragments of Paleozoic limestones Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuated and recrystallized diabase groundmass

Tbx — Crackle breccia
Ruin granite showing round to angular fragments with minor diabase

Tqlp — Quartz latite porphyry dike

Thlp — Hornblende latite porphyry dike

Tqm | **Tqmp** — Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

Late Cretaceous

Thmp — Hornblende monzonite porphyry

Td — Tortilla quartz diorite

PRECAMBRIAN

db — Diabase

pЄr — Ruin granite, aplitic facies stippled

STRUCTURE

Strike and dip of beds

Contact
Dashed where approximated, dotted where concealed

Fault
Showing dip; dashed where approximated; dotted where concealed

Fault breccia and gouge

inclined subvertical vertical

Joint set
Continuous, planar J_1-set showing direction and amount of dip;
(20), designates the number of J_1-surfaces encountered in a 10ft. traverse taken normal to joint set

ALTERATION

Quartz-pyrite vein
showing direction and amount of dip
Quartz-pyrite vein or joint coating containing the following accessory minerals:
sericite, calcite, chlorite, o epidote, ✱ black tourmaline rosette, ◇ specularite, ● magnetite

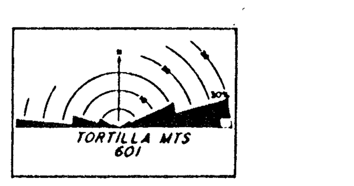
MISCELLANEOUS

Geochemical rock-chip traverse

Geochemical rock-chip sample of vein

Drill hole location

LARAMIDE STRIKE ROSETTE



601-1,000ft. strike segments of mineralized Laramide structures and dikes

FIGURE 12 Contoured geochemical distribution of copper (ppm) in selected vein and fault-vein samples

0 1000 2000 3000
Scale in feet

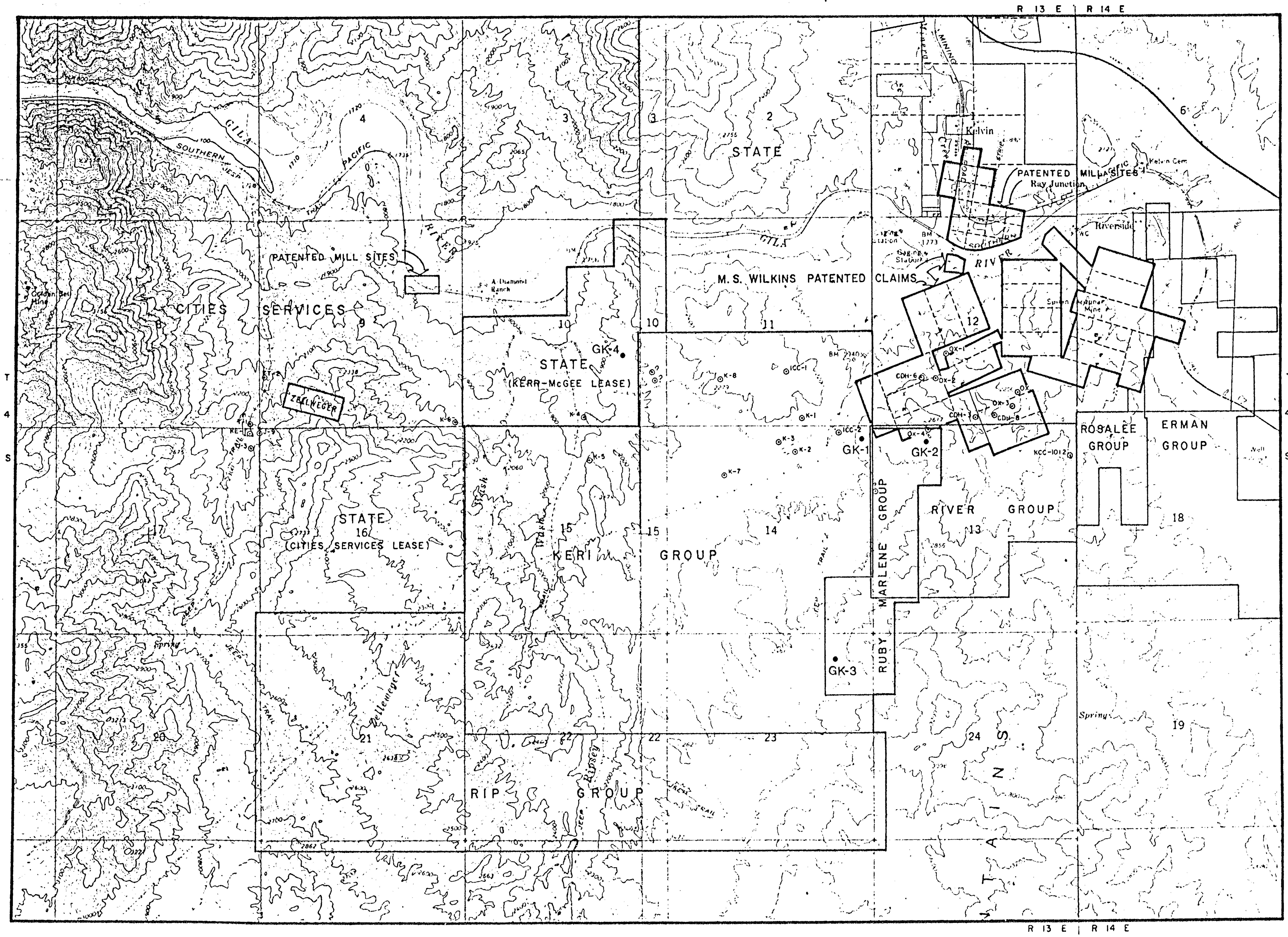
DETAILED GEOLOGIC MAP OF THE RIVERSIDE (KELVIN) DISTRICT

PINAL COUNTY, ARIZONA

Gulf Mineral Resources Co.

BY: J. Wilkins, T.L. Heidrick, G.R. Wessel
DRWN. BY: K.A.C.

PROJ. NO. TAO 77-22
DATE: Oct. 1977



EXPLANATION

LAND STATUS

- Kerr-McGee claims, options, and leases
- Ruby Marlene claim group; Kerr-McGee option; overstaked in part by Kennecott
- Kennecott claims
- Kennecott patented claims and millsites
- M.S. and Lucy Wilkins patented claims
- Cities Services claims, options, and leases
- Rosa Lee claim group, approximate location
- Other deeded lands

DRILL HOLES

- K-1 Kerr-McGee diamond drill hole
- OX-1 Occidental diamond drill hole
- ICC-1 Inspiration drill hole
- KCC-1012 Kennecott diamond drill hole
- CDH-1 1949 churn drill hole
- KE-1 Cyprus diamond drill hole
- T-1 Tipperary rotary drill hole
- J-3 Johnson rotary drill hole
- ? Drill hole, party unknown

N

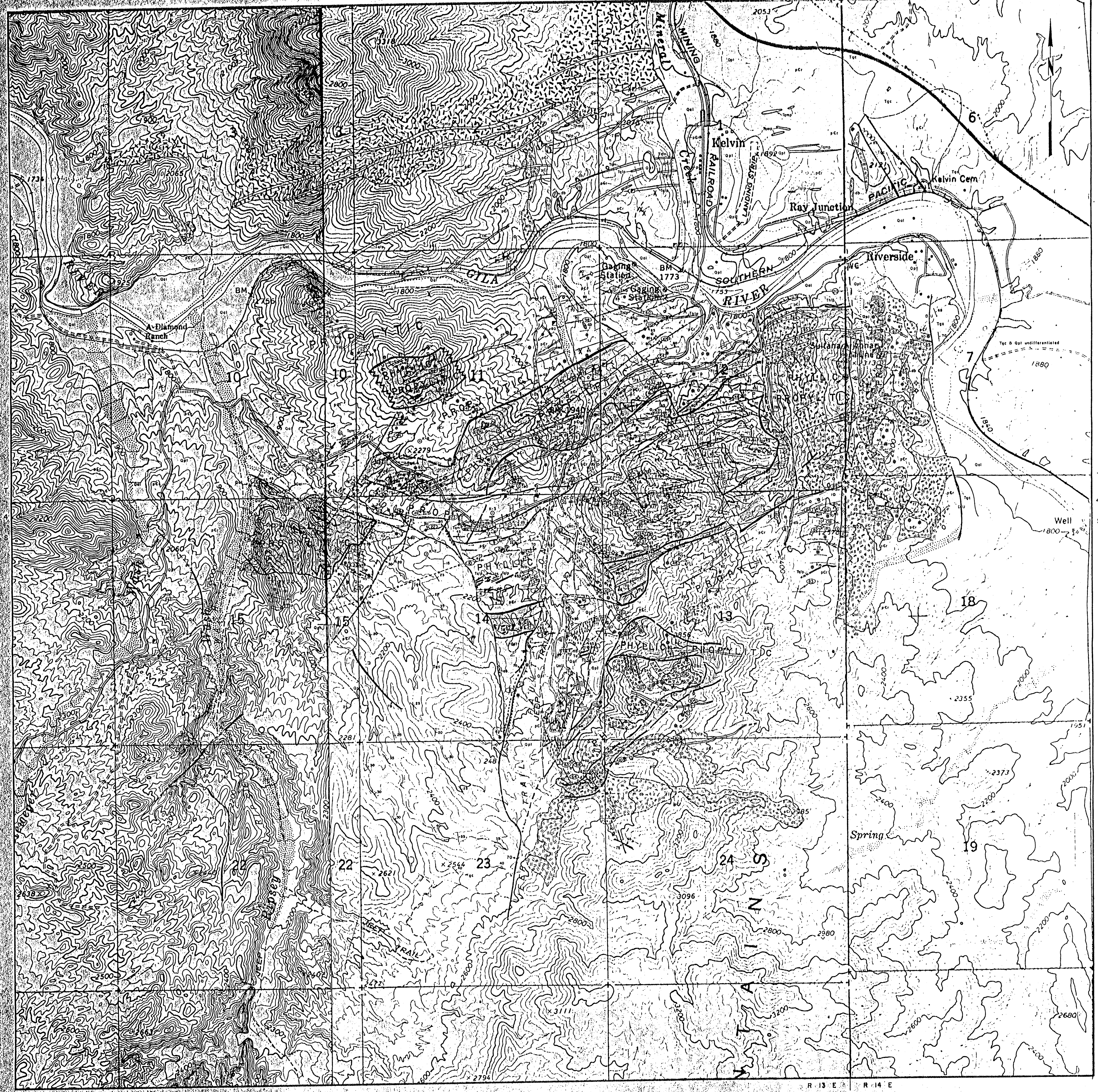
0 2000 4000
Scale in feet

DRILL HOLE LOCATION AND LAND STATUS MAP
KELVIN PROJECT
PINAL COUNTY, ARIZONA

Gulf Mineral Resources Co.

BY: J. Wilkins
DRWN BY: K.A.C.
PROJ. NO. TAO 77-22
DATE: Oct. 1977

Figure 2



EXPLANATION

LITHOLOGY

QUATERNARY

Qal — Alluvium, sand, gravel, and boulders

Qpt — Pediment and river gravels and talus undifferentiated

--------*ANGULAR UNCONFORMITY*--------

TERTIARY

Tgc — Gila conglomerate
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method).

LARAMIDE

Paleocene

Ttm — Teapot Mountain monzonite

Tibx — Intrusion breccia
Round to angular fragments of Paleozoic limestones Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuted and recrystallized diabase groundmass

Tbx — Crackle breccia
Ruin granite showing round to angular fragments with minor diabase

Tqlp — Quartz latite porphyry dike

Thlp — Hornblende latite porphyry dike

Tqm | Tqmp — Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

Late Cretaceous

Thmp — Hornblende monzonite porphyry

Td — Tortilla quartz diorite

PRECAMBRIAN

db — Diabase

p€r — Ruin granite, aplitic facies stippled

STRUCTURE

Strike and dip of beds

Contact
Dashed where approximated, dotted where concealed

Fault
Showing dip; dashed where approximated; dotted where concealed

Fault breccia and gouge

inclined 63 — subvertical (20) — vertical

Joint set
Continuous, planar J_1-set showing direction and amount of dip;
(20), designates the number of J_1-surfaces encountered in a 10ft. traverse taken normal to joint set

ALTERATION

Quartz-pyrite vein
showing direction and amount of dip
Quartz-pyrite vein or joint coating containing the following accessory minerals:
sericite, calcite, chlorite, o epidote, ✱ black tourmaline rosette, ◇ specularite, ● magnetite

MISCELLANEOUS

Geochemical rock-chip traverse

Geochemical rock-chip sample of vein

Drill hole location

LARAMIDE STRIKE ROSETTE

TORTILLA MTS 601

601-1,000ft. strike segments of mineralized Laramide structures and dikes

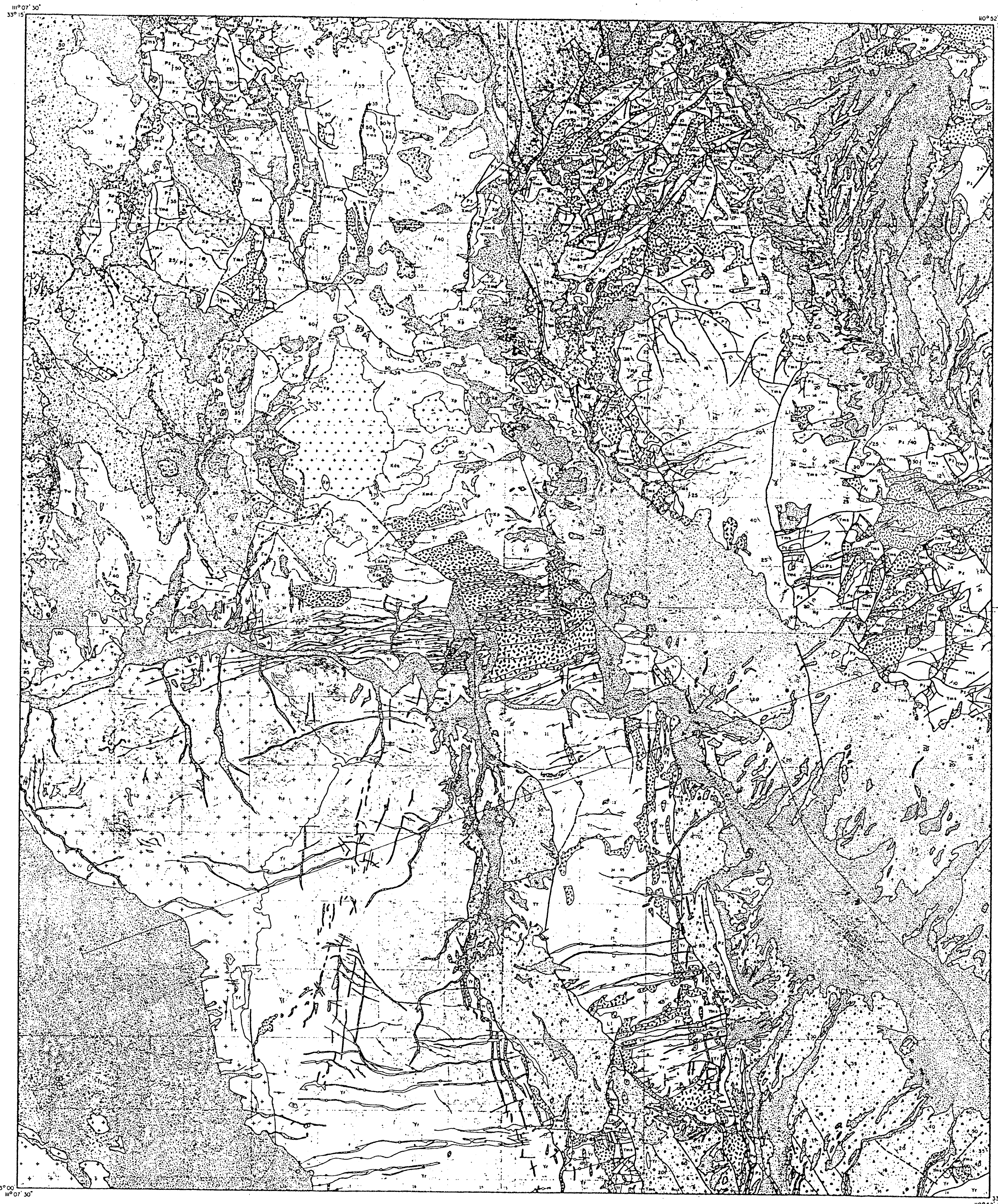
FIGURE 10. Alteration map.

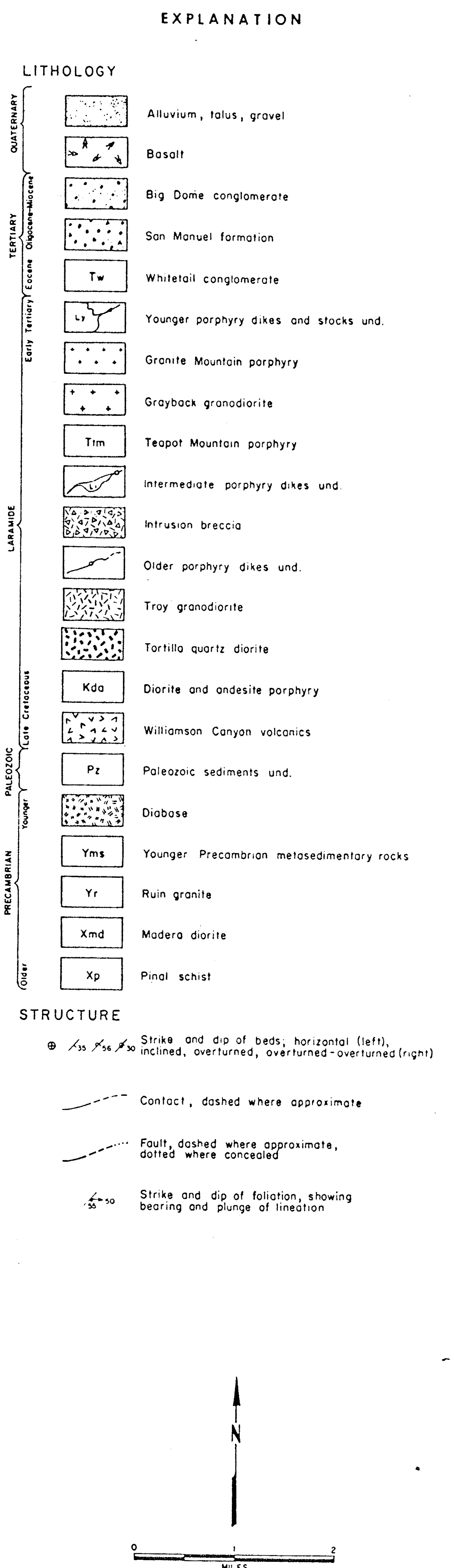
0 — 1000 — 2000 — 3000
Scale in feet

DETAILED GEOLOGIC MAP OF THE
RIVERSIDE (KELVIN) DISTRICT
PINAL COUNTY, ARIZONA

Gulf — Gulf Mineral Resources Co.

BY: J. Wilkins, T.L. Heidrick, G.R. Wessel — PROJ. NO. TAO 77-22
DRWN. BY: K.A.C. — DATE: Oct. 1977





GENERALIZED GEOLOGIC MAP OF THE TEAPOT MTN., SONORA, GRAYBACK, AND KEARNY QUADRANGLES

KELVIN PROJECT

GILA AND PINAL COUNTIES, ARIZONA

Gulf Mineral Resources Co.

Data from: Creasey, S.C., et al., 1974; Cornwall, H.R., et al, 1971; Cornwall, H.R., Krieger, M.H., 1975

By: T.L. Heidrick

Drwn by: K.A.C.

Proj. no. TAO 77-22

Date: Nov., 1977

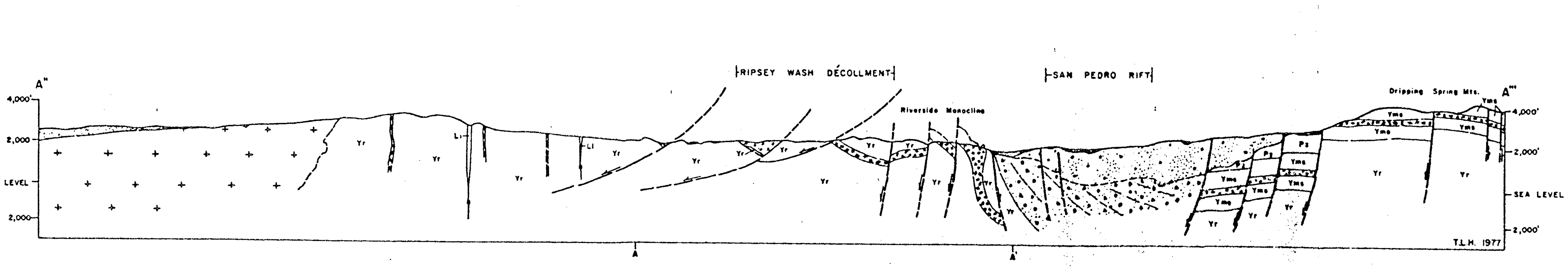
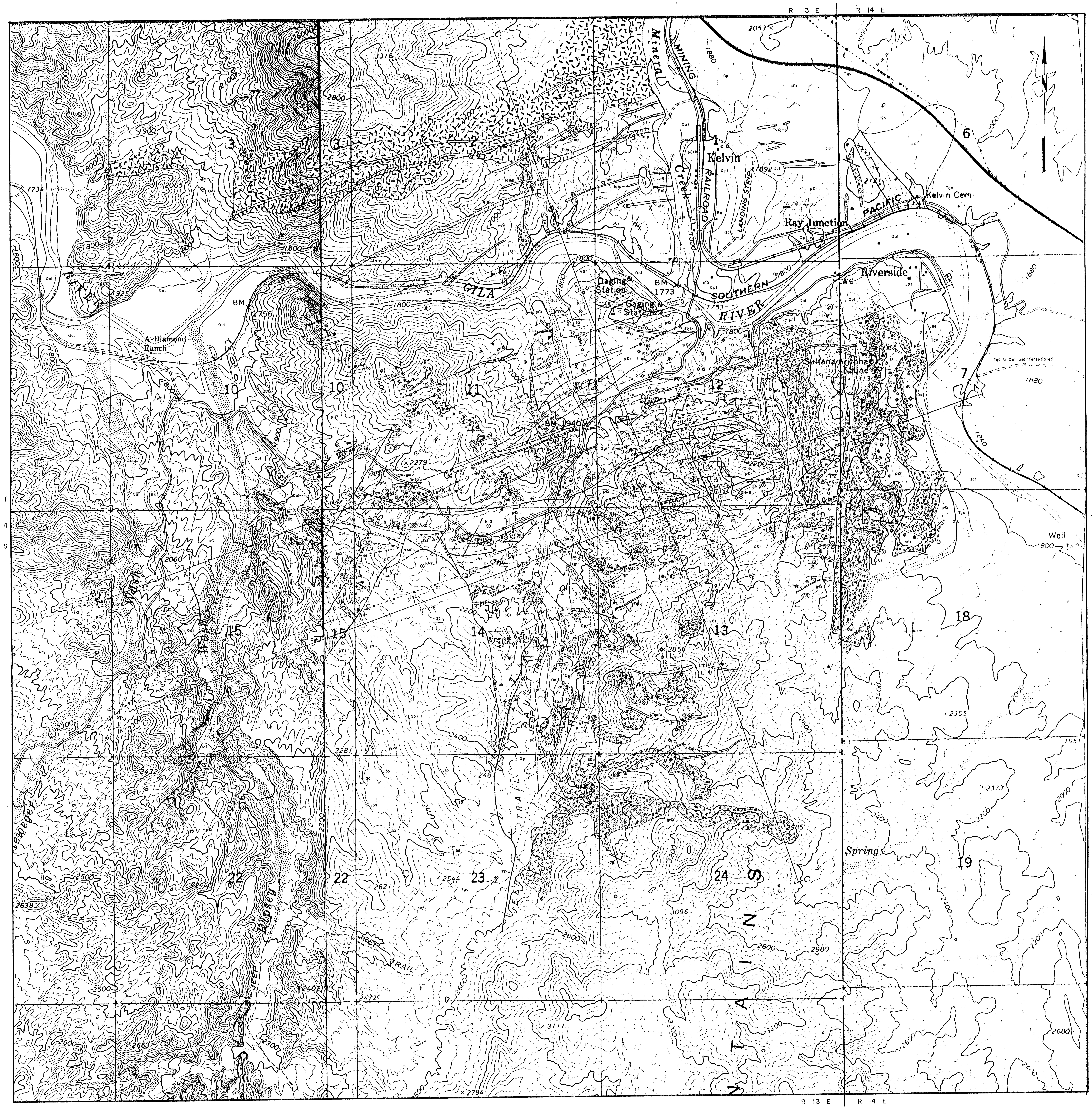


Figure 4



EXPLANATION

LITHOLOGY

QUATERNARY

Qal

Alluvium, sand, gravel, and boulders

Qpt

Pediment and river gravels and talus undifferentiated

———*ANGULAR UNCONFORMITY*———

TERTIARY

Tgc

Gila conglomerate
Granite to limestone pebble, cobble, and boulder conglomerates; includes the Big Dome and San Manuel formations undifferentiated (Krieger, Cornwall, and Banks, 1973). An upper tuff unit dates 14 and 17 m.y., while a lower tuff unit dates 17-18 and 24 m.y. (K-Ar method).

LARAMIDE — Paleocene

Ttm

Teapot Mountain monzonite

Tibx

Intrusion breccia
Round to angular fragments of Paleozoic limestones Apache group sedimentary rocks, diabase, and Ruin granite in a finely comminuated and recrystallized diabase groundmass

Tbx

Crackle breccia
Ruin granite showing round to angular fragments with minor diabase

Tqlp

Quartz latite porphyry dike

Thlp

Hornblende latite porphyry dike

Tqm | Tqmp

Tqm, quartz monzonite; Tqmp, quartz monzonite porphyry dike undifferentiated

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Hornblende monzonite porphyry

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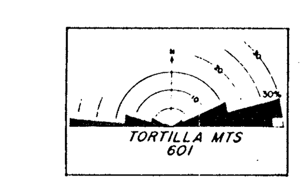
LARAMIDE STRIKE ROSETTE



601-1,000ft. strike segments of mineralized Laramide structures and dikes

0 1000 2000 3000
Scale in feet

DETAILED GEOLOGIC MAP OF THE RIVERSIDE (KELVIN) DISTRICT

PINAL COUNTY, ARIZONA

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FIGURE 2