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PROJECT Kelvin - Minbanco DRILL HOLE J-1 SCALE 1" = 100' PAGE NO. 1 OF 1

DEPTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn	Native Copper	Copper Oxides	STRUCT.	ROCK
2000' elevation	.04	<.001	0	0					
	.203								
	.07	<.001	0	.03					
	.05								
	.04								
	.13	<.001	0	.04					
	.03								
	.07								
	.072	.001	0	0					
	.420	.003	0	.007	.08				
		.011							
	.321	.007	0	.041					
		.007							
	.105								
	.06								
	.06								
	.08								

started 9/11/68
completed 9/16/68
5¼ inch hammer bit
Location: 320' FWL & 1260 FSL
Section 9, T.4S., R.13E.
Pinal Co., Arizona
Collar elevation = 2085'

water

Scattered

below 2000' elevation ≈ .1541 % Cu

70' = 0.378% Cu

530'

General Description

0-530': Precambrian (?) Quartz Monzonite unless otherwise noted.

diabase

PROJECT Kelvin - Minbanco DRILL HOLE NO. J-2 SCALE 1" = 100' PAGE NO. 1 OF 1

LENGTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn
	.07				
	.02				
100					
	.01				
200					
	.01				
300	.02				
	.01				
	.02				
400					
	.03			0	
				0	
	.01				
500					
	.03			0	
	.015				

2000' elevation

Started: 11/15/68
completed: 11/20/68
6 1/2 inch hammer bit
Location: 840' FWL & 1400' FSL, section 9, T.4S., R.13E., Pinal Co., Arizona
Collar elevation: 2133'

17' of 8 5/8" casing

below 2000' elevation = .0213 % Cu

582'

STRUCT. | ROCK

General Descripti

0-582': Precambrian (?) Quartz Monzonite unless otherwise noted.

23' - strong weathering

53' = base of surface weathering

diabase

PROJECT Kelvin-Minbanco DRILL HOLE J-4 SCALE 1" = 100' PAGE NO. 1 OF 1

LENGTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn		STRUCT.	ROCK	General Description
	.03					Started: 12/6/68 Completed: 12/9/68 6 1/2 inch hammer bit Location: 520' FWL & 280' FNL, section 16, T4S., R13E., Pinal Co., Arizona Collar elevation: 2305'			Precambrian Quartz Monzonite (+,+) and diabase
	.07								32' base of intense surface weathering
100	.04								
	.05								
200	.05								
300	.02								
	.02					below 2000' elevation: .0300 % Cu			
400	.05	.001	0	.04					
	.02					426'			

2000' elevation

DRILL HOLE RECORD

PROJECT Kelvin-Minbanco DRILL HOLE J-3 SCALE 1" = 100' PAGE NO. 1 OF 1

LENGTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn		STRUCT.	ROCK	General Description
	.05					Started: 11/21/68 completed: 12/6/68 6½" hammer bit to 642' 6¼" rock bit 642-1165' Location: 170' FEL & 240' FSL. Sec 8, T.4S., R.13E., Pinal Co., Arizona. Collar elevation: 2170'			0-1165: Precambrian (??) Quartz Monzonite with diabase dikes (green).
	.21								
2000' elevation									
	.02								
	.03								
	.18								
	.03					1500-2000' elevation = .2422 % Cu.			
	.06								
	.12	.0195	0	0	.03				
			0	0					
	.512	.1084	0	0	1.52				
			.005	.19					
	.096	.0315	0	0	.14				
		.007			.40	160' = .322 Cu + .0796 Mo ≈ .720 Cu equivalent			
1500' elevation	.351	.0958	0	.053	2.00				
	.0533	.0163							
	.06	.026							
	.08	.016	0	0					
	.1929	.0369	0	.023	.26	1000-1500' elevation = .1294 % Cu			
	.1064	.0267	0	0	.157				
			0	0	.49				
	.11	.008							
	.09	.007							
1000' elevation	.05	.008							
	.09	.007							
	.04	.003							
	.055	.004							
						1165'			

DRILL HOLE RECORD

PROJECT *Kelvin-Minbanco* DRILL HOLE *J-6* SCALE *1" = 100'* PAGE NO. *1* OF *1*

LENGTH		ASSAYS Cu	Mo	Au	Ag	Zn		STRUCT.	ROCK	General Description
		.01					Started: 12/13/68 Completed: 12/21/68 6½" hammer bit to 1184' 6¼" rock bit to 1244' Location: 610' FEL & 760' FNL Sec. 17, T. 4 S., R. 13 E., Pinal Co., Arizona Collar elevation: 2246'			
		.01								
00										
		.02								
		.01	.013							
50	2000' elevation	.01								
		<.01	.002							
		.02								
00		.02	<.001							
		<.01								
50		.10					1500'-2000' elevation ≈ .0246 % Cu.			
		.05								
		.01								
00		.04								
		.01								
00		<.01								
		.04								
00	1500' elevation	.045	<.001							
		.06								
300		.01								
		.03								
00		.043	.015	.01	0	.066	1000'-1500' elevation ≈ .0272 % Cu			
		.02								
000		.02	.007							
		.01	.002							
		<.01								
00		<.01	<.001							
	1000' elevation	.025	.005	0	0	.03				
00		.06								
		.03	.002							
							1244'			

PROJECT Kelvin-Minbanco DRILL HOLE No. J-7 SCALE 1" = 100' PAGE NO. 1 OF 1

LENGTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn		STRUCT.	ROCK	General Descriptio.
	.02					Started: 1/18/69 completed: 1/22/69 6 1/2 inch hammer bit to 522' rock bit to 581' Location: 1130' FEL & 320' FSL section 8, T.4S., R.13E., Pinal Co., Arizona Collar elevation = 2290'			Precambrian (??) Quartz monzonite with minor diabase dikes.
									50' = base of surface weathering
100	.03	<.001							
	.025								
200									
300	.01	.002				below 2000' elevation = <.0100 % Cu			
	.01								
400	<.01								
	.01								
500	.01	<.001				581'			

2000' elevation

DRILL HOLE RECORD

PROJECT Kelvin-Minbanco DRILL HOLE J-8 SCALE 1" = 100' PAGE NO. 1 OF

LENGTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn		Fe Ox.	STRUCT.	ROCK	General Description
	.01					Started: 1/24/69 completed: 2/1/69 5 1/2" hammer bit to 762' Rock bits to 972' Location: 630' FWL & 210' FSL, Sec. 9, T 4S., R13E., Pinal Co., Arizona Collar elevation: 2295'				0-972: Precambrian (?) Quartz Monzonite with minor diabase dikes (green).
										← approximate base of oxidation
	.02									first water
	.02	<.001	0	.01	.22					} 20% limonite
2000' elevation	.01									
	<.01									
						1500'-2000' elevation ≈ .0395 % Cu				
	.03									
	.02	.001			.04					
	.04									
	.03									
	.04									
	.03									
	.02									
736'			0	0	.50					
	.065	.001								
1500' elevation	.03									
	.04									
	.04									
						972'				

DRILL HOLE RECORD

PROJECT Kelvin-Minbanco DRILL HOLE J-9 SCALE 1"=100' PAGE NO. 1 OF 1

LENGTH	ASSAYS (%) Cu	Mo	Au	Ag	Zn		STRUCT.	ROCK	General Description
						Started: 2/3/69 completed: 2/27/69 6" hammer bit to 538' rock bits below Location: 300' FEL & 250' FNL Sec. 17, T. 4S., R. 13E., Pinal Co., Arizona collar elevation: 2210'			0-38: Recent alluvium 38-2320: Precambrian (?) Quartz Monzonite & diabase dikes (green).
	<.01								
2000' elevation	.017	.001							
	<.01								
	.01								
	.02	.001							
						1500'-2000' elevation ≈ .0250 % Cu			
	.04								
	<.01								
	.02								
	.05								
	<.01								
1500' elevation	.03								
	.01								
	.01								
	<.01								
						1000'-1500' elevation ≈ .0142 % Cu			
	.04								
	.01								
1000' elevation	.01								
	.01								
	.01								
	.01								
	.01								
						500'-1000' elevation = .01 % Cu			
500' elevation									
						sealevel-500' elevation ≈ .0360 % Cu			
	.03								
	.03	.001							
	.04								
	.04								
sealevel	.04								
	.01								
	.05								2320'

DRILL HOLE RECORD

PROJECT KELVIN-TIPPERARY DRILL HOLE 1 SCALE 1" = 50' PAGE NO. 1 OF 4

LENGTH	ASSAYS % Cu	ASSAYS % Mo				miscellaneous	pyrite	chalcopyr	MoS_2	Fe_2O_3	CuO	native Cu	kaolin	sphaler.	bornite		qtz vns.		chlorite	STRUCT.	ROCK
						LOCATION: 125' FSL & 300' FEL OF SECTION 8, T.4S., R13E., PINAL CO., ARIZONA TD = 1400' - ROTARY MARCH 1970 6-5/8 CASING @ 52' Temp. Abd.															Qal
50						THIS LOG HAS BEEN MODIFIED FROM A LOG BY TIPPERARY RESOURCES - NO SAMPLES HAVE BEEN SEEN BY C.S.M.C. PERSONNEL.															
100																					P€gr
	.017	.010				35': .2126 Cu															
	.027	.010				.0246 Mo															
	.418	.040				.334 Cu equivalent															
	.800	.069																			
	.097	.010																			
150	.058	.010																			db
	.064	.023																			
200																					P€gr
250																					
300																					Tm
350																					

General Description

Quaternary Alluvium (Qal), 0-34': medium coarse grained with fragments of granite, diabase, diorite and quartz.

Precambrian Oracle Granite (P€gr), 34-144' et.a white quartz, orange orthoclase feldspar, trace biotite, 10%

Precambrian(?) Diabase (db), 144-153': bla diabase dike with stringers of qtz with, chalcopyrite & pyrite.

Tertiary (?) Monzonite (Tm), 232-918': monzonite with 10% biotite, 20% felds 70% quartz, feldspars altered t, traces o pyrite, biotite often in books.

From verbal descriptions by Tipperary th unit has the following ~~of~~ composition:

quartz : 62.5%
plagioclase: 17%
K-spar : 4.9%
biotite : 6.6%
chlorite : 9%

} K-spar = 22.3% of total feldspar.

The composition plus surficial geologic mapping (ZELINSKI) indicate that this unit is most probably correlative with the Tertiary-Cretaceous (Laramide) Grayback Granodiorite.

PROJECT KELVIN - TIPPERARY DRILL HOLE 1 SCALE 1"=50' PAGE NO. 2 OF 4

LENGTH	ASSAYS % Cu	ASSAYS % Mo	ASSAYS	ASSAYS	ASSAYS	miscellaneous	FeS_2	$CuFeS_2$	MoS_2	Fe_2O_3	CuO	native Cu	Kaolin	sphaler.	bornite		qtz. vns.		chlorite	STRUCT.	ROCK	General Description
400																						
450																						
500																					Tm	
550																						
600																						
650																					Tm	
700																						
		.023 .184 .168 .068 .010				40': .1684 Mo .842 Cu equivalent																

Cu equivalent.

DRILL HOLE RECORD

PROJECT KELVIN-TIPPERARY DRILL HOLE 1 SCALE 1"= 50' PAGE NO. 3 OF 4

LENGTH	ASSAYS % Cu	ASSAYS % Mo	miscellaneous	FeS2	CuFeS2	MoS2	Fe2O3	CuOx	native Cu	kaolin	sphaler.	bornite	qtz vns	chlorite	STRUCT.	ROCK	General Description
		.555															
		.329															
	.798	.087															
	.632	.073	40': .3905 Cu														
	.265	.019	.0368 Mo														
	.818	.032	.574 Cu equivalent														
	.363	.039	80'= 0.708+														
	.076	.024															
	.114	.010															
800	.058	.010															
850																Tm	
900																	
950																	
1000																	
1050																	
1100																	

PROJECT KELVIN - TIPPERARY DRILL HOLE 1 SCALE 1" = 50' PAGE NO. 4 OF 4

LENGTH	ASSAYS % Cu	ASSAYS % Mo				miscellaneous	FeS_2	$CuFeS_2$	MoS_2	Fe_2O_3	Cu	nat. Cu	Kaolin	sphaler.	bornite		qtz. vns.		chlorite	STRUCT.	ROCK	General Description
1150																						
1200																						
1250																						
1300																						
1350																						
1400						1400' = TD																

DRILL HOLE RECORD

PROJECT TIPPERARY-KELVIN DRILL HOLE T-1 SCALE 1" = 100' PAGE NO. 1 OF 2

LENGTH	ASSAYS % Cu	ASSAYS % Mo					STRUCT.	ROCK
						collar elevation = 2175'		
100								
	.2116	.0246				35' = 0.3346 Cu equivalent		
200								
300								
400								
500								
600								
700		.0772						

DRILL HOLE RECORD

PROJECT TIPPERARY-KELVIN DRILL HOLE T-1 SCALE 1" = 100' PAGE NO. 2 OF 2

LENGTH	ASSAYS % Cu	ASSAYS % Mo					STRUCT.	ROCK
		.4420				80' = 0.6925 Cu equivalent		
800	.3905	.0305						
900								
1000								
1100								
1200								
1300								
1400								

DRILL HOLE RECORD

PROJECT KELVIN - TIPPERARY DRILL HOLE NO. 2 SCALE 1" = 50' PAGE NO. 1 OF 5

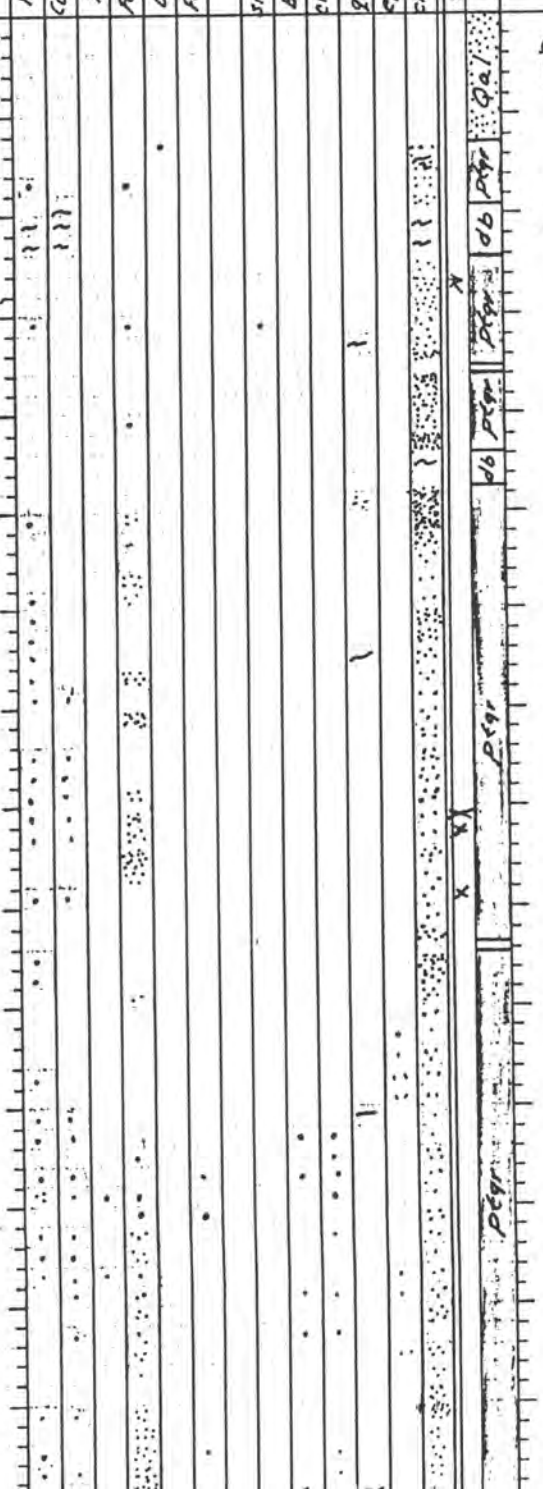
LENGTH	ASSAYS % Cu	% Mo	% Cu (comp)	comp. Cu
	.34			
	.03			.118
	.03			
50	.07			
	.03			
	.05			.032
	.02			
	.02			
	.04			
	.02			
	.04			.032
	.02			
	.03			
100	.05			
	.03			
	.02			.028
	.03			
	.03			
	.03			
	.04			
	.03			.026
	.01			
	.02			
150	.03			
	.03			
	.03			.034
	.03			
	.04			
	.04			
	.03			
	.03			.028
	.03			
	.03			
200	.02			
	.04			
	.05			.048
	.06			
	.05			
	.04			
	.04			
	.03			.082
	.05			
	.21			
250	.08			
	.03			
	.02			.022
	.02			
	.02			
	.02			
	.03			
	.07			.026
	.02			
	.02			
300	.02			
	.02			
	.02			.022
	.02			
	.03			
	.02			
	.036			
	.084			.042
	.030			
	.029			
350	.03			
	.032			
	.044			.041
	.074			
	.030			

miscellaneous

LOCATION: 1260' FSL & 150 FWL OF SECTION 9, T 4S, R. 13 E., PINAL CO., ARIZONA.
T.D. = 1625 ROTARY
MARCH 1970

THIS LOG HAS BEEN MODIFIED FROM A LOG BY TIPPERARY RESOURCES. NO SAMPLES HAVE BEEN SEEN BY C.S.M.C. PERSONNEL.

Fe_2O_3 includes "limonite" & specularite



General Description

Quaternary Alluvium (0-32'): medium coarse grained with fragments of granite, diabase, diorite & quartz.

Precambrian Oracle Granite (pCgr):

Precambrian (?) Diabase (db): Tippera interpreted this unit to be Mesozoic

PROJECT Kelvin-Tipperary DRILL HOLE 2 SCALE 1" = 50' PAGE NO. 2 OF 5

LENGTH	ASSAYS % Cu	% Mo	% Cu (comp.)	comp. Cu	miscellaneous	FeS_2	$CuFeS_2$	MoS_2	Fe_2O_3	Cu Ox	Fe_3O_4	sphaler.	bornite	chalcoc.	gtz. vns.	epidote	chlorite	STRUCT.	ROCK	General Description
	.363																			
	.029																			
	.028			.099																
	.016																			
400	.058																			
	.025																			
	.013																			
	.033			.032																
	.016																			
	.074																			
	.018																			
	.010																			
	.010			.012	Tr $CaCO_3$ in vnlt in db															
	.010																			
450	.014																			
	.023																			
	.032																			
	.052			.033																
	.034																			
	.025																			
	.066																			
	.116																			
	.040			.075																
	.067																			
500	.086																			
	.05																			
	.118																			
	.086			.075	25' = 0.0966 % Cu.															
	.027																			
	.093																			
	.159																			
	.02																			
	.03			.052																
	.02																			
550	.03																			
	.02																			
	.02																			
	.03			.041																
	.04																			
	.093																			
	.032																			
	.024																			
	.019			.026																
	.026																			
600	.028																			
	.02																			
	.02																			
	.03			.026																
	.03																			
	.03																			
	.02																			
	.054																			
	.023			.066																
	.13																			
650	.03																			
	.02																			
	.042																			
	.018			.028																
	.029																			
	.029																			
	.012																			Tertiary (?) Monzonite (Tm) } these units m
	.021																			Tertiary (?) diorite (Td) } be correlative
	.018			.040																with the Terti
	.040																			Cretaceous
700	.048																			Grayback Gran
	.038																			diorite
	.044																			
	.028			.029																
	.015																			
	.022																			
	.016																			
	.024																			
	.018			.064																
	.054																			

PROJECT Kelvin-Tipperary DRILL HOLE NO. 2 SCALE 1"=50' SHEET NO. 3 OF 5

LENGTH	ASSAYS % Cu	% Mo			Comp. Cu	miscellaneous	FeS_2	$CuFeS_2$	MoS_2	Fe_2O_3	CuO	Fe_3O	sphaler.	bornite	chalcoc	qtz. vns.	epidote	chlorite	STRUCT.	ROCK	General Description
	.084																				
	.018																				
	.041				.049																
	.039																				
	.064																				
	.050																				
	.036																				
	.049				.041																
	.030																				
800	.040																				
	.048																				
	.048																				
	.075				.082																
	.106																				
	.132																				
	.094																				
	.026																				
	.110				.102																
	.15																				
850	.13																				
	.09																				
	.04																				
	.07				.066																
	.06																				
	.07																				
	.26																				
	.162	.025																			
	.141	.016			.179																
	.192	.010																			
900	.141	.010																			
	.050	.010																			
	.084	.010																			
	.092	.010			.164																
	.088	.012																			
	.504	.017																			
	.160																				
	.102																				
	.029				.115																
	.132																				
950	.151																				
	.144																				
	.098																				
	.057				.087																
	.058																				
	.08	.003																			
	.13																				
	.35																				
	.24				.182																
	.104																				
1000	.088																				Tertiary Quartz Diorite Porphyry (Tqdp)
	.258																				
	.146																				
	.182				.136																
	.061																				
	.044																				
	.10																				
	.11																				
	.18				.146																
	.15																				
1050	.19																				
	.078	.004																			
	.218																				
	.060				.107																
	.106																				
	.074																				
	.049																				
	.059																				
	.776	.010			.246																
	.133	.019																			
1100	.214	.015																			
	.08																				
	.10																				
	.15				.119																
	.12																				

DRILL HOLE RECORD

PROJECT Kelvin-Tipperary DRILL HOLE NO. 2 SCALE 1"=50' SHEET NO. 4 OF 5

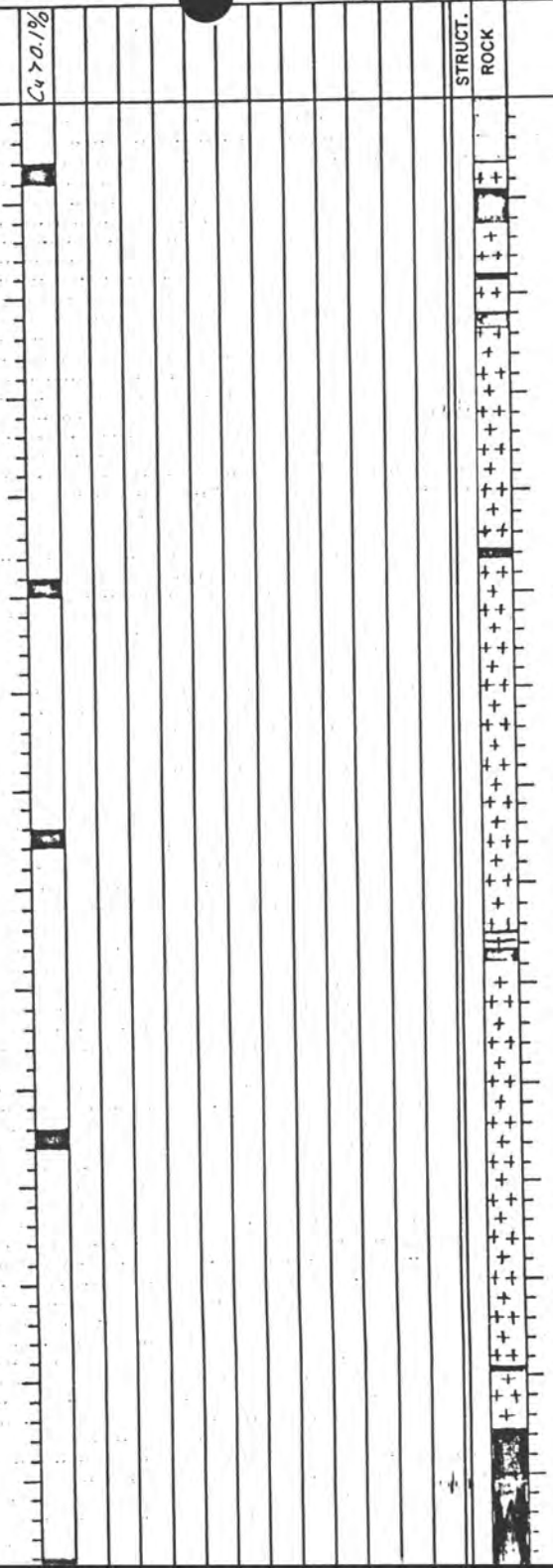
LENGTH	% Cu	% Mo	comp. Cu	miscellaneous	FeS_2	$CuFeS_2$	MoS_2	Fe_2O_3	CuOx	Fe_3O_4	sphaler.	bornite	chalco.	qtz. vns.	epidote	chlorite	STRUCT.	ROCK	General Description
	.138	.012																	
	.184																		
	.22		.172																
	.20																		
1150	.12																		
	.14																		
	.09																		
	.240	.016	.164																
	.131	.008																	
	.22																		
	.21																		
	.122	.019																	
	.165		.137																
	.10																		
1200	.09																		
	.488	.007																	
	.23																		
	.15		.216																
	.10																		
	.11																		
	.11																		
	.166	.010																	
	.472		.190																
	.15																		
1250	.05																		
	.17																		
	.28																		
	.20		.206																
	.131																		
	.25																		
	.08																		
	.262																		
	.216	.004	.154																
	.14																		
1300	.07																		
	.05																		
	.18																		
	.15		.170																
	.19																		
	.280																		
	.180																		
	.254	.016																	
	.212		.166																
	.115																		
1350	.070																		
	.150																		
	.085																		
	.106	.002	.108																
	.100																		
	.100																		
	.140	.004																	
	.150	.004																	
	.626	.011	.245																
	.200																		
1400	.110																		
	.070																		
	.100																		
	.150		.098																
	.069																		
	.10																		
	.19																		
	.08																		
	.08		.124																
	.15																		
1450	.12																		
	.13																		
	.230																		
	.110		.136																
	.080																		
	.130																		
	.090																		
	.110	.017																	
	.120		.109																
	.090																		

PROJECT Kelvin - Tipperary DRILL HOLE NO. 2 SCALE 1" = 50' PAGE NO. 5 OF 5

LENGTH	% Cu	% Mo				miscellaneous	FeS_2	$CuFeS_2$	MoS_2	Fe_2O_3	CuO	Fe_3O	sphaler.	bornite	chalco.	qtz. vns.	epidote	chlorite	STRUCT.	ROCK	General Description
	.080																				
	.100																				
	.103				.108																
	.087																				
	.168	.004																			
	.150																				
	.231					25' = 0.170 % Cu															
	.167				.148	≈ 0.19 % Cu equivalent															
	.132																				
1550	.062																				
	.053																				
	.110	.003																			
	.050	.002			.096																
	.160																				
	.106																				
	.195	.005																			
	.178	.007																			
	.160				.168																
	.245																				
1600	.060					45' = 0.203 % Cu															
	.180					≈ 0.23 % Cu equivalent															
	.203																				
	.299	.005			.247																
	.304	.004																			
						1625' is T.D.															

PROJECT TIPPERARY-KELYIN DRILL HOLE NO. T-2 SCALE 1" = 100' PAGE NO. 1 OF 3

LENGTH	ASSAYS % Cu					
						collar elevation = 2080'
00						
00						
00						
400						
	.0469					
500						
600						
700						



PROJECT TIPPERARY-KELVIN DRILL HOLE NO. T-2 SCALE 1" = 100' PAGE NO. 2 OF 3

LENGTH	ASSAYS % Cu					Cu > 0.1%	STRUCT.	ROCK
800								
900								
1000								
1100								
1200								
	.1541							
1300								
1400								

ROJECT _____ DRILL HOLE NO. T-2 SCALE 1" = 100' PAGE NO. 3 OF 3

LENGTH		ASSAYS % Cu					Cu > 0.1%										STRUCT.	ROCK
1600																		

TIPPERARY LAND AND EXPLORATION CORPORATION

INDUCED POLARIZATION SURVEY

OF THE

KELVIN AREA, PINAL COUNTY, ARIZONA

FOR

TIPPERARY RESOURCES CORPORATION

MAY 1970

BY

HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964 TUCSON, ARIZONA 85703
PHONE: 623-0578 Area Code: 602

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Line 0E/W (Spread 1, a = 1000')

Line 0E/W (Spreads 2 & 3, a = 500')

Line 10E (Spread 1, a = 1000')

Line 10E (Spreads 2 & 3, a = 500')

Line 20E (Spread 1, a = 1000')

Line 30E "

Line 40E "

Line 50E "

Line 10W (Spread 1, a = 1000')

Line 10W (Spreads 2 & 3, a = 500')

Line 20W (Spread 1, a = 1000')

Line 30W "

Line 40W "

Line 50W "

Basis of the Induced Polarization Method

GENERAL LOCATION
of
THE KELVIN AREA
FOR
TIPPERARY RESOURCES CORPORATION

ARIZONA

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INTRODUCTION

At the request of Mr. C.R. Williams, Senior Minerals Geologist, Tipperary Resources Corporation, Heinrichs GEOEXploration Company conducted and completed a comprehensive induced polarization survey in the Kelvin Area, Pinal County, Arizona. The field work was done during the interim March 10 to May 5,1970.

A total of eleven lines were completed, all oriented N-S. A coordinate grid was used whose origin is the southeast corner of Section 8, T4S, R13E to which all lines and stations have been referred. The lines are separated by 1000 feet and a station spacing (dipole or "a" spacing) of 1000 feet was utilized except on Lines 0E/W, 10E and 10W where a more detailed spacing of 500 feet was also employed. The total surface coverage counting both dipole spacings was 37.5 miles of which 24.5 miles was "subsurface" plotted data points.

The dual frequency I.P. technique was used with sending frequencies of 0.3 and 3.0 Hz with a GEOEX MK-7 sender and a GEOEX MK-4C receiver. The collinear dipole-dipole configuration was the electrode arrangement employed which on a 1000 foot spacing should typically give resolvable penetration within the zone from roughly 300 feet to approximately 1200 to 1500 feet below surface.

The purpose of this survey was to aid in delineating a subsurface sulfide zone and thereby help to define drilling targets in a mineralized area evidenced by several surface showings of copper and molybdenum and partially defined by several existing drill holes.

The data are presented on Sectional Data Sheets, one for each line and spacing, showing resistivity, percent frequency effect (PFE) and metallic conduction factor (MCF) contoured in section with self potential (SP) in profile form. An "Induced Polarization Location and Interpretation Plan" is also included showing the surface projected plan interpretation of the 1000 foot dipole data relative to the land net and overlays a portion of the U.S.G.S. 1:24,000 scale Grayback Topographic Quadrangle which is also included herewith and which shows the surface projected 500 foot dipole data interpretation. For additional details concerning theory, interpretation and presentation, see the "Basis of the Induced Polarization Method" appended to the report.

Heinrichs personnel involved in the field work were D. Chaffin, geophysical crew chief; D. Kern, J. Boduch, J. Patten, B. Coons and W. Wright, technical assistants with W. Freeman, Geophysicist supervising in the field. Report and interpretation by C. Ludwig, Senior Geophysicist assisted by the GEOEX staff.

CONCLUSIONS

Anomalous induced polarization effects are seen on all lines and define a WNW-ESE trending zone roughly through the central portion of the area surveyed. The total width of this zone varies from about 3500 feet to 5000 feet considering the very weak (and sometime poorly defined) fringes. The stronger core of the anomaly is about 1500 feet to 2000 feet in width and lies roughly between 15W and 35E.

The cause of the anomalous response is likely metallic lustered sulfide mineralization. Within the stronger anomalous core about 0.5 to 2.0% by volume total bulk average sulfides is indicated based on a comparison with "typical" disseminated sulfide zones in the Southwest. This concentration crudely represents 1.0 to 4.0% total sulfide by weight and therefore could certainly be of economic interest providing the ratio between minerals of copper, molybdenum etc., to the iron minerals is reasonably high.

Depth to the top of this indicated mineralization varies from within 150 feet of the surface on portions of Lines 0E/W and 10E and becomes progressively deeper east and west thereof. The greatest depth to the top of polarizable mineralization noted is on Line 50E where the main causative body may be deeper than 1500 feet below surface. Dip is difficult to determine by the I.P. technique but there is some evidence of a southerly dip (or top slope of a broad body) in several portions of the area.

Based on the geologic data available to us, no obvious correlation is noted between any particular geologic units or structure and the I.P. anomaly. Therefore it is possible that the polarizable zone is caused by or related to some unexposed intrusive or structure at depth roughly below the anomalous area. However, no obvious change is seen in the geophysical data with depth, thereby suggesting in excess of 1500 feet to this postulated intrusive or structure or simply that there is a lack of electrical contrast with the overlying material. The induced polarization response in general shows no obvious evidence of having a depth limited source. Sulfides are expected to persist to at least 1500 feet in depth - the probable limit of resolvable "penetration" of the resultant data.

The resistivity is relatively uniform and rather non-diagnostic. Portions of the more strongly polarized zone have lower associated resistivities probably caused by the concentration of conductive sulfide mineralization and associated alteration.

Lower resistivity is also seen where there is an appreciable thickness of recent alluvium overlying the crystalline bedrock as on the north ends of Lines 20E and 30E in the Gila River gravels. Higher resistivities are associated with the topographic effect of erosional resistant ridge crests and perhaps tighter or more silicified rock. The highest resistivities are noted near 35N on Lines 40W and 50W where the most extreme topography on the survey was traversed.

Many of the lines show a broad self potential low, correlating with the anomalous I.P. response, which is likely reflecting concentrations of relatively interconnected, actively oxidizing sulfides within several hundred feet of the surface.

RECOMMENDATIONS

Because of the geophysical correlation with encouraging copper - molybdenum mineralization at depth in DH-2 it is recommended that a fairly extensive and deep drilling program be executed to more completely evaluate the rest of the significant appearing induced polarization anomaly. Eight drill holes are proposed in order of geophysical priority - some of which will of course depend on the results of higher priority holes, existing drilling and geological and geochemical information available, all of which should be in constant correlation.

1. Line 0E/W near 19N to test a rather strong but narrow near surface polarizable zone apparently merging at depth with the broad main anomaly. This drill hole should go to about 600 feet to evaluate the shallow anomaly but could effectively be carried to at least 1000 feet and preferably to 1500 feet to also test the northern portion of the broad anomaly at depth.

2. Line 10E near 13N to test the strongest I.P. response noted on the survey. This hole should be at least 1000 feet in vertical depth to properly evaluate the zone of interest. Mineralization is expected from within about 150 feet of the surface to at least 1200 to 1500 feet in depth.

3. Line 0E/W near 7.5N (or essentially equivalently near 5N on Line 10E) to test one of the stronger and deeper portions of the main anomaly. This hole is approximately midway between your DH-1 and DH-2 and will give additional information as to the mineralization across the width of the anomalous zone. To completely evaluate the section of interest, the hole should be programmed for about 1500 feet total depth and should depend to some degree on the results of Recommendation 1. above.

4. Line 0N/W near 7S to test a minor zone of increased mineralization, within the fringe zone, which shows up best on the more detailed 500 foot coverage. A relatively shallow hole - about 500 feet - should suffice to evaluate this target unless encouragement is obtained. The expected strength of mineralization in this area is roughly only one half that of the stronger core of the main anomaly and it will therefore necessitate a very high copper to iron ratio to be economically interesting. Because of this low expected sulfide content, drilling at this stage should only be considered if there is supporting geological or geochemical data.

5. If Recommendation 2. proves encouraging then a hole is suggested near 7.5N on Line 70E to test a zone of similar response. A minimum drilling depth of 1000 feet should be considered to properly sample the interesting section.

6. If Recommendation 5. proves encouraging, a drill hole near 5S on Line 30E should be considered and again should be programmed for a minimum of 1000 feet in depth.

7. and 8. Depending on drilling results on Line 0E/W, two holes could be considered on Line 10W; near 17.5N and 7.5N. Somewhat deeper and/or weaker mineralization is expected compared to Line 0E/W and drilling here should be in excess of 1000 feet in depth to effectively sample the target.

All of the above drilling is considered vertical as recommended. However, if after several holes have been completed and if a definite and persistent dip is established, inclined drilling may prove more efficient.

Additional geophysical drill targets can be located by reference to the interpretation plan surface projected anomalism and its correlation with existing drill information. The weaker fringes of the I.P. anomaly should be given some consideration especially if in areas having evidence of a high copper to iron ratio. In fact in many mining areas, the weaker I.P. zones are of more interest than the stronger portions which may only be reflecting high pyrite concentrations. In this area, because of the rather low overall indicated sulfide concentration, initial attention has been focused on the stronger sulfide zones in the hope that they would have the highest probability of being economically interesting.

Further detailed I.P. coverage should be considered particularly if some of the more shallow mineralization becomes of interest. Reconnaissance I.P. along the general strike of the mineralized zone east and west of the present coverage is also suggested if the prospect continues viable. A semi-reconnaissance ground magnetic survey would conceivably delineate a related intrusive at depth as well as other possibly significant features of mineralization and structure and would be relatively inexpensive.

DRILLING OF I.P. TARGETS

To maximize the probability that a recommended drill hole will intersect the source of an induced polarization anomaly, the following points should be considered.

1. The anomaly has been caused by some physical property, hopefully a polarizable body containing economically interesting metallic mineralization, and this property should be determined before abandoning the anomaly.

2. Location of drill holes should be made relative to the actual sending and receiving electrode positions as they exist on the ground.

3. Due to inherent limitations in the I.P. method, depth interpretations are only approximate and the determination of dip is severely limited, particularly for angles greater than 45°. Also, targets can generally be laterally resolved no finer than the station spacing (dipole length). Because of these limitations, targets less than one dipole spacing in width, particularly when steeply dipping or deeper than the dipole length, may be difficult to intersect. In these cases, several drill holes in a fence line should be considered. For the steeply dipping cases, angle drilling may also prove advantageous, mainly where the direction of dip can be geologically inferred and the drill hole oriented such that an optimum intersection of the zone of interest is obtained.

4. An observed anomaly can be the effect of a polarizable body laterally offset to the side of a line and therefore if practical, drilling should be confined to those portions of the anomalous zones well defined by several lines. Also, it should be noted that a single line cannot define the strike direction of an elongate anomalous zone - another reason for utilizing several parallel lines.

5. Logging of the drill core <u>must</u> be done with special care to note the quantity of <u>all</u> possible polarizable material such as pyrite, graphite, magnetite, manganese oxides and clay minerals as well as the polarizable ore minerals. The anomalous source could conceivably be overlooked if the core is not carefully logged.

6. Typical sections of core representing the gross physical properties of material encountered in the drilling should be tested in the laboratory for their I.P. parameters, if there is some doubt about confirmation of the anomalous source.

INTERPRETATION

Line OE/W (Spread 1, a = 1000', Spreads 2 & 3, a = 500'):

The detailed coverage on Spreads 2 & 3 defines a moderately strong, narrow (about 500' in width) near surface and somewhat depth limited anomaly whose source is indicated near 20N and is associated with a self potential low suggestive of relatively interconnected, actively oxidizing sulfides. Depth to the top of this anomaly source is likely less than 150 feet and the source probably continues to 300 or 400 feet below surface where it becomes weaker in indicated strength of mineralization. This somewhat reduced indicated mineralization may persist indefinitely below the near surface body and in fact may persist below 1500 feet based on the 1000 foot dipole coverage. There is even some indication that the overall sulfide content may increase again below about 1000 feet in depth.

North of this moderate strength anomaly, the response fairly rapidly decreases to background near 27.5N. A minor probably very narrow source anomaly is noted near 45N and is apparently quite limited in size since it is not observed on nearby parallel traverses.

South of the moderate anomaly the response more gradationally diminishes to very weak in strength from 12.5N to 2.5S where slightly increased response is noted continuing to about 10S. This minor increase in anomalism is probably caused by a zone roughly 500 feet in width, coming to within 150 feet of the surface but having very good depth persistence. South of 15S very uniform background is noted.

The deeper penetrating 1000 foot dipole coverage shows a zone between about 0N/S to 25N of moderate strength I.P. response having very good depth persistence and a sharp cutoff to background to the north and a gradational decrease to the south.

In the area of the moderate anomalism, there is some evidence of a fairly steep southerly dip of the overall mineralization. This may explain in part why DH-2 intersected interesting mineralization shallower than DH-1. Both of these drill holes appear to be within the zone of stronger anomalism but DH-1 is quite near the southern fringe and this may also explain why less mineralization was intersected compared to DH-2 which is more centrally situated in the anomalous zone.

This deeper information suggests that the shallow anomalies in near 20N and 7S on Spreads 2 and 3 are continuous with and just projections of the broad deeper main anomaly.

The resistivity is quite uniform on this Line. A minor low correlates with portions of the stronger I.P. zone. The weak zone near 7S appears to relate to an area slightly higher in resistivity perhaps due to silicification or simply less fractured, tighter rock. The self potential shows a general low over the entire width of the complete I.P. anomaly but with a pronounced fairly narrow low relating to the shallow moderate strength I.P. anomaly at 20N on Spread 2 likely reflecting the near surface oxidizing concentrated sulfides in that area.

Line 10E (Spread 1, a = 1000', Spreads 2 & 3, a = 500'):

The I.P. response on the Line is quite similar to that seen on Line 0E/W, but is somewhat stronger, in fact the strongest seen on the survey. There is a rather pronounced resistivity low associated with the stronger I.P. response which lies mainly between 7.5N and 20N. A definite self potential low also correlates with the stronger I.P. effects. Again there seems to be several near surface zones of concentrated sulfide merging at depth with the main broad anomaly. The strongest of these shallow zones appears to originate from near 17.5N and to progressively become deeper to the south. Another, but weaker, near surface zone is noted near 7.5S correlating with a similar anomaly 1000 feet to the west on Line 0E/W. Resistivities on this line are more erratic, at least on Spread 2, than on Line 0E/W perhaps due in part to topographic ridge effects.

Line 20E (Spread 1, a = 1000'):

Line 20E shows a good corralation to Line 10E, Spread 1 except for being somewhat weaker in I.P. response and indicating about 300 to 500 feet to the top of the main concentration of mineralization instead of less than 150 feet as on Line 10E. Also, the two near surface projections noted on the two lines directly west are no longer evident. There is still a broad self potential low and a minor resistivity low correlating with the stronger I.P. effects which lie mostly between 0N/S and 15N.

Line 30E (Spread 1, a = 1000'):

This Spread shows a well defined I.P. anomaly whose source is mainly between 20S and 15N and having a moderate strength core from 10S to 5N obviously correlating with the moderate zone on Line 20E but displaced about 1000 feet to the south. Depth to the source and anomaly strength is similar to Line 20E and again there are

associated resistivity and self potential lows.

The extreme north end of this line and Line 20E show lower resistivities apparently related to relatively conductive gravels in the Gila River channel.

Line 40E (Spread 1, a = 1000'):

As on Line 30E, a well defined anomaly is seen between 20S and 15N. However this anomaly suggests a considerably deeper source than on Line 30E, perhaps in excess of 1000 feet to the zone of most concentrated sulfides. Weak mineralization may come to much closer to the surface, however. Again there is an associated broad self potential low, Minor zones of high and low resistivity are seen to relate to the I.P. anomaly.

Line 50E (Spread 1, a = 1000'):

A very deep source is indicated on this Spread, perhaps in excess of 1500 feet below surface, and likely correlating with the deep response noted on Line 40E. A broad self potential low and erratic resistivities are associated. As on Line 40E, weak sulfides may be present much shallower than the indicated depth to the main concentration of mineralization.

Line 10W (Spread 1, a = 1000', Spreads 2 & 3, a = 500'):

Line 10W shows a fair degree of pattern correlation with Line OE/W but is quite a bit weaker in strength of I.P. response and somewhat deeper appearing. The near surface anomaly near 20N is much subdued and has almost completely merged with the main broad anomaly. At depth, on the 1000 foot dipole coverage, the response is nearly as strong as data from a similar depth on Line OE/W and is therefore of some interest. It is possible however, that the response at depth is actually a lateral effect from mineralization east of the line near Line OE/W.

The resistivities are fairly uniform and show no obvious correlation with the I.P. response. The self potential also shows no well defined relation to the I.P. response.

Line 20W (Spread 1, a = 1000'):

The I.P. response on this line is quite similar to that noted on Line 10W in strength (except at depth where it is weaker), position, shape and indicated depths. However, there is a pronounced resistivity high centered near ON/S which gives some complexity

to the MCF pattern. This resistivity high may be caused by a quartz monzonite or aplite dike as indicated on the Geologic Map by Mr. T.L. Hanks. There is no obvious significant appearing sulfide response from this dike based on the I.P. data. No self potential data was obtained on this line due to improperly balanced non-polarizing electrodes.

Line 30W (Spread 1, a = 1000'):

An I.P. anomaly centered near 10N similar to that on Line 20W is noted but which is somewhat deeper and narrower. The resistivities are quite complex and again show a high area near 0N/S perhaps caused by the same dike as on Line 20W. Another resistivity high is noted near 20N which is likely related to the high ridge topographic effects and/or erosionally resistant, tighter, less conductive material. A broad self potential low is apparently related to the zone of increased I.P. response.

Line 40W (Spread 1, a = 1000'):

This line shows only very weak and very deep appearing I.P. effects. The depth to the causative source may be in excess of 1200 feet in the vicinity of 5N but the source is likely a portion of the same sulfide zone seen on lines to the east. A minor but more shallow appearing anomaly is noted south of 15S. There is no obvious resistivity correlation but a broad self potential low seems to relate to the 5N I.P. zone. There is a very high zone of resistivity near 30N again apparently reflecting the high topographic ridge in that area.

Line 50W (Spread 1, a = 1000'):

Very similar I.P. effects are seen here compared to Line 40W with deep response below about 5N and more shallow but still very weak effects south thereof. The resistivity is erratic but still shows very high values crossing the ridge near 35N. A near surface conductive zone is present roughly between 25S and 5N perhaps reflecting more deeply weathered material. No significant self potential effects are seen along the traverse.

Respectfully submitted:

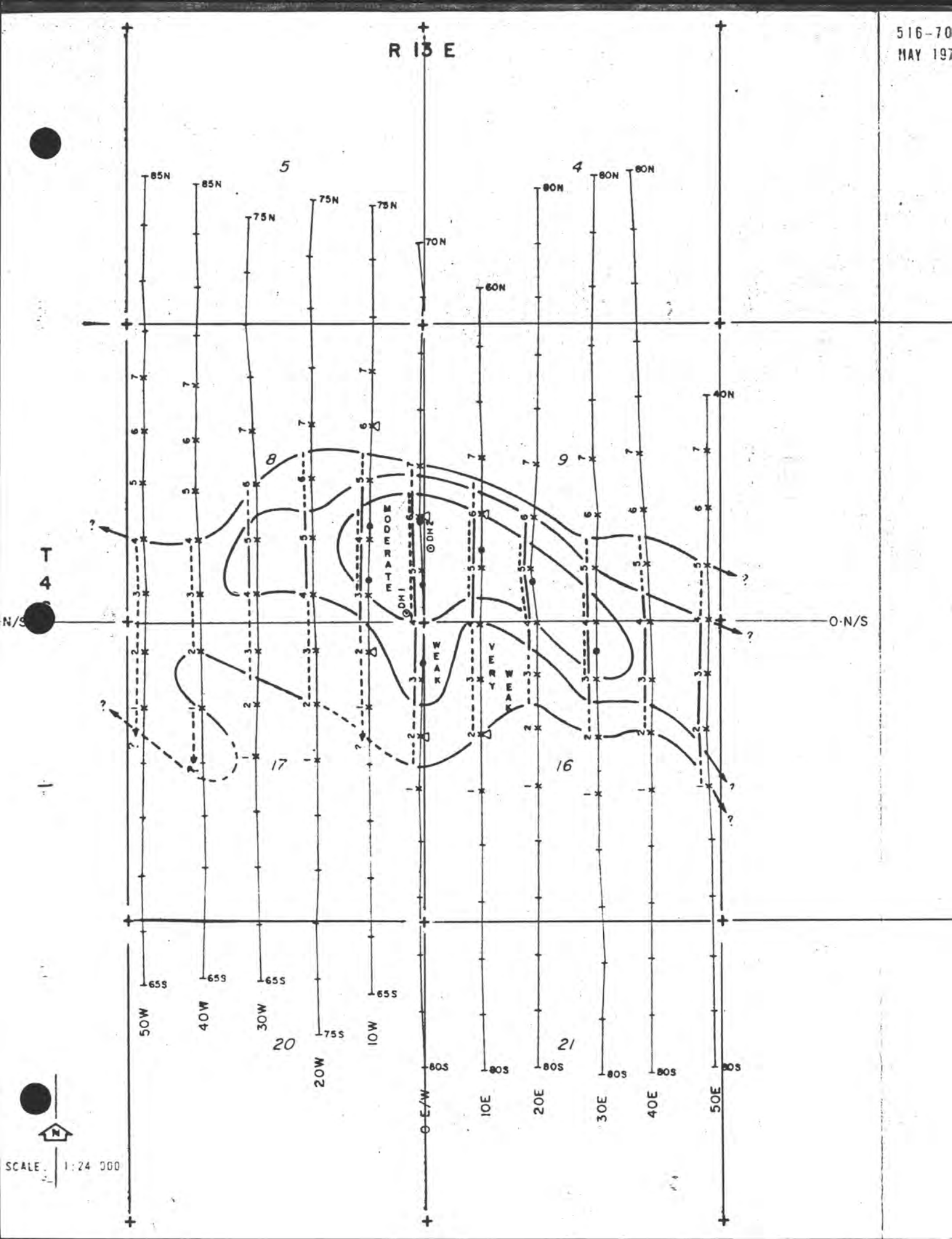
HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig

Chris S. Ludwig
Senior Geophysicist

APPROVED: Walter E. Heinrichs, Jr.
President

May 22, 1970
Tucson, Arizona



516-70
MAY 197
R 13 E
T 4
5
4
8
9
17
16
20
21
85N
75N
70N
60N
80N
40N
65S
75S
80S
MODERATE
WEAK
VERY WEAK
DH1
DH2
O·N/S
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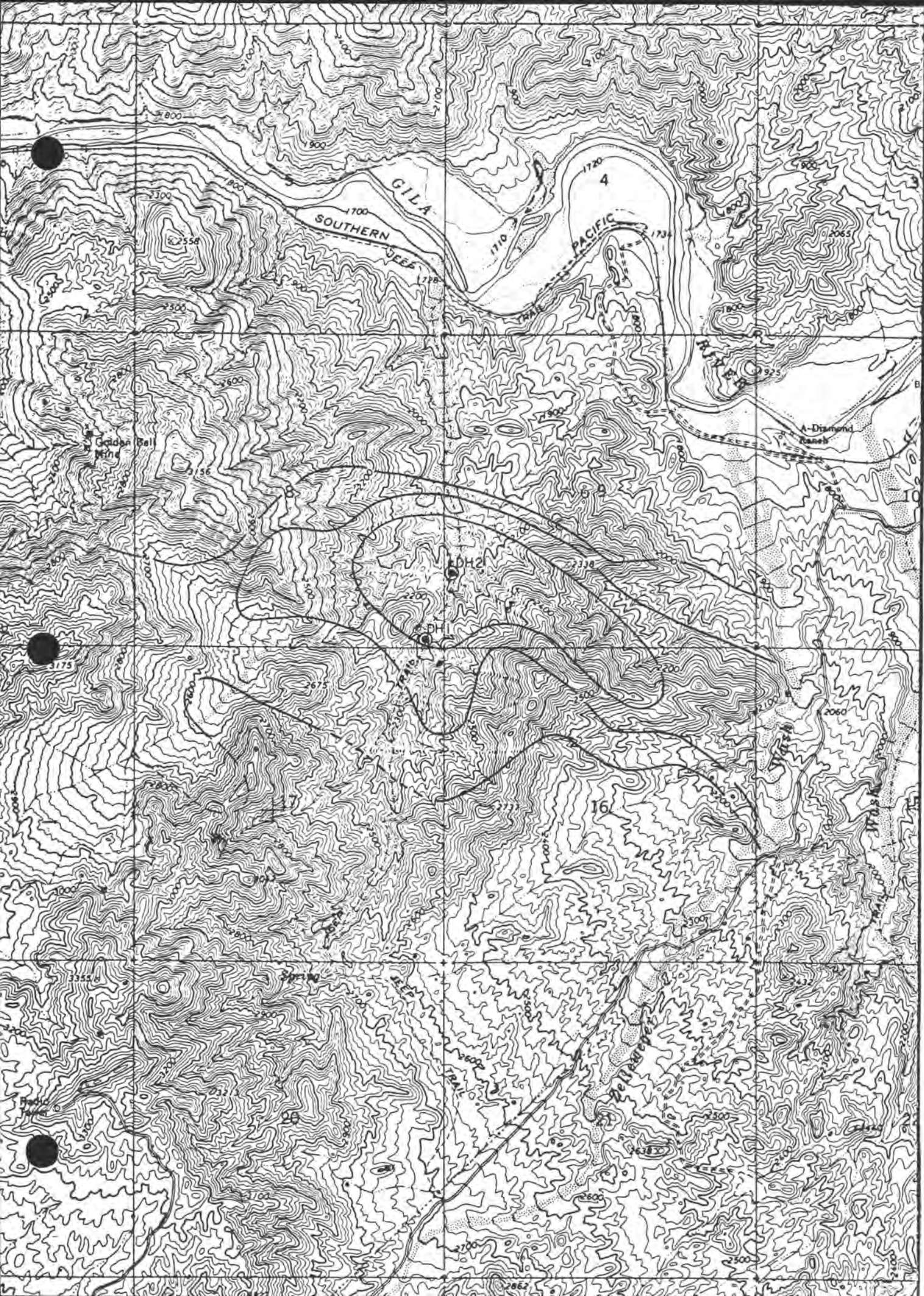

GILA
SOUTHERN
PACIFIC
JEEP
TRAIL
RIVER
A-Diamond Ranch
Golden Bell Mine
DH2
DH1
Wash
Spring
Radio Tower
Dellenweger
4
5
8
9
10
16
17
20

516-7
MAY 1

/16-70
MAY 1970

INDUCED POLARIZATION LOCATION AND INTERPRETATION PLAN

of

THE KELVIN AREA
PINAL COUNTY, ARIZONA

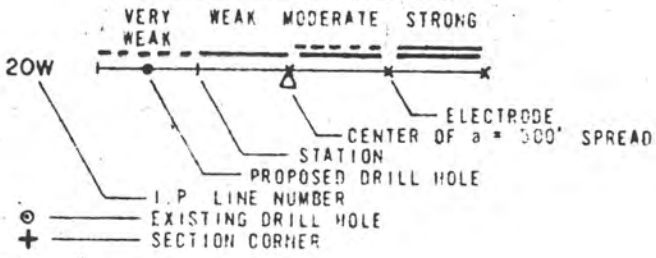
for

TIPPERARY RESOURCES CORPORATION

by

HEINRICHS GEOEXPLORATION COMPANY

RELATIVE ANOMALY STRENGTH



NOTE: This sheet overlays U.S.G.S. Greyback quadrangle 7.5 minute series (scale 1:24 000) 1964.

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geophysical engineers
vancouver
sydney

516-70
MAY 1970

TOPOGRAPHIC MAP
of
THE KELVIN AREA
PINAL COUNTY, ARIZONA
for
TIPPERARY RESOURCES CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY

ZONES OF EQUAL RELATIVE ANOMALY STRENGTH
BASED ON a 1000' DATA:

MODERATE

WEAK

VERY WEAK

NOTE: This map is a portion of U.S.G.S. Grayback quadrangle, 7.5 minute series (scale 1:24 000) 1964.

TRC 6-18-70

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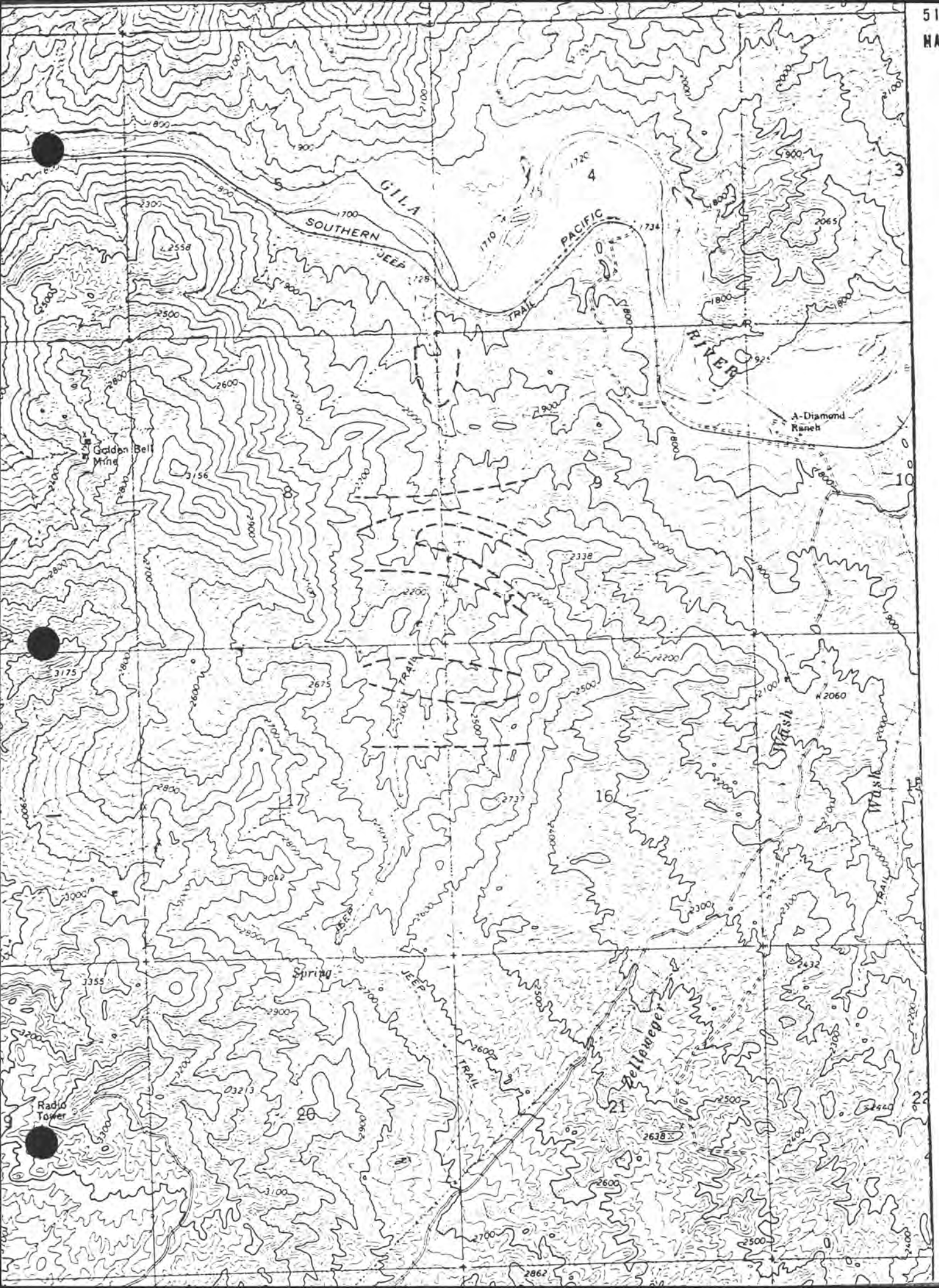
sydney

516-70
MAY 19


GILA
RIVER
SOUTHERN PACIFIC
JEEP TRAIL
A-Diamond Ranch
Golden Bell Mine
Wash
Zellweger
Spring
Radio Tower

516-70
MAY 1970

TOPOGRAPHIC MAP
of
THE KELVIN AREA
PINAL COUNTY, ARIZONA
for
TIPPERARY RESOURCES CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY

ZONES OF EQUAL RELATIVE ANOMALY STRENGTH
BASED ON a ~~1000'~~ 500' DATA:

[ ] MODERATE

[ ] WEAK

[ ] VERY WEAK

NOTE: This map is a portion of U.S.G.S. Grayback quadrangle, 7.5 minute series (scale 1:24 000) 1964.

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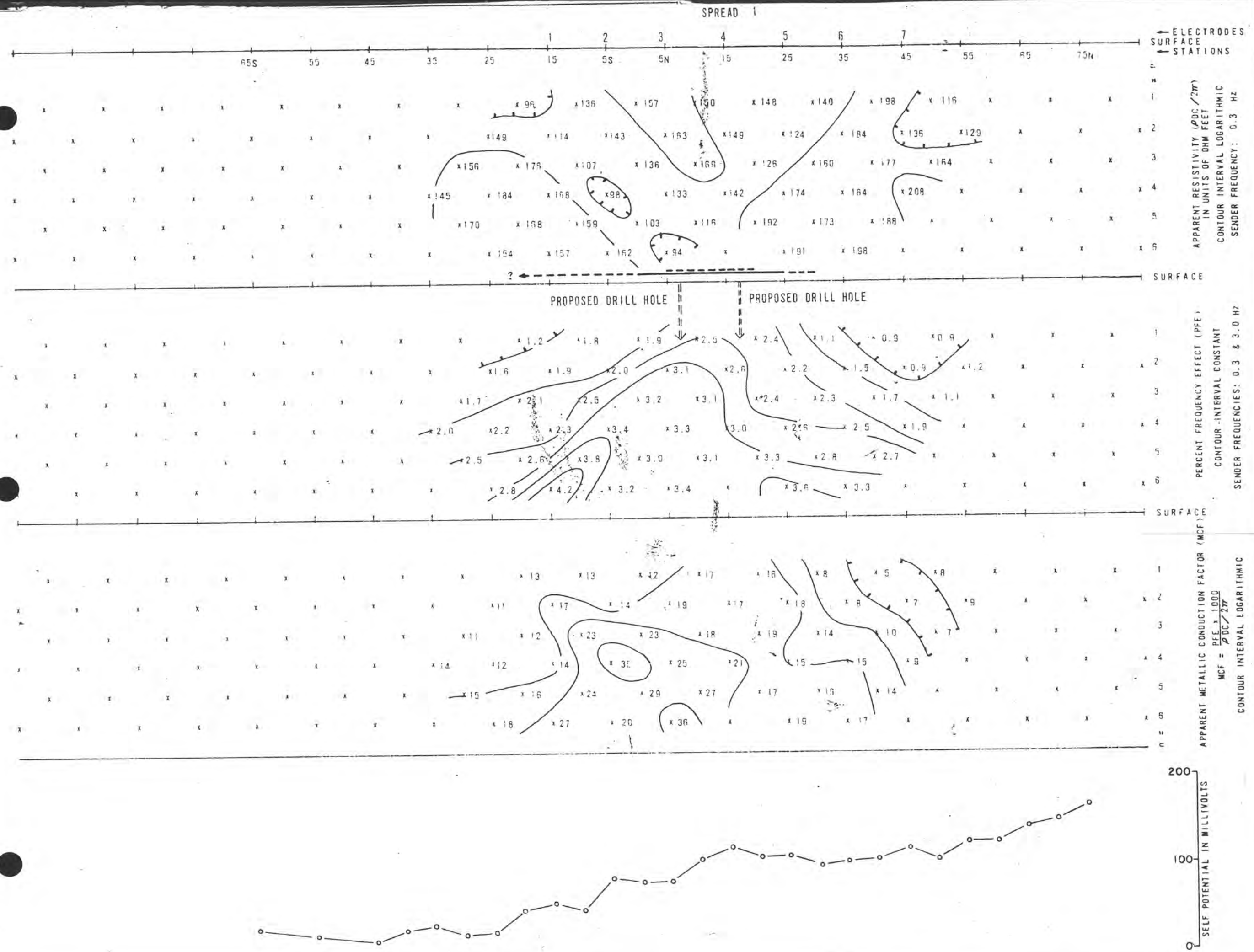
vancouver
sydney



516-70

LINE NO.
10W
SPREAD(S)
1

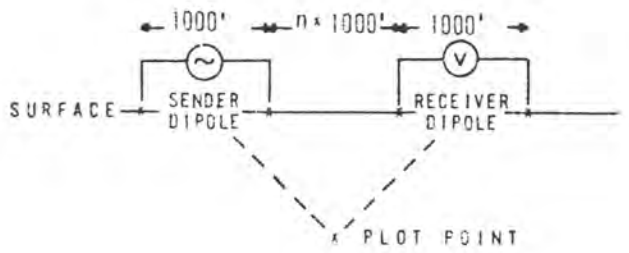
INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



AREA

KELVIN

LOOKING

WEST

DATE

MARCH 1970

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LINE NO.
0 E/W
SPREAD(S)
2 & 3

INDUCED POLARIZATION TRAVERSE
SECTIONAL DATA SHEET
for
TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

DIPOLE DIPOLE ELECTRODE ARRAY

AREA
KELVIN

LOOKING
WEST

DATE
MARCH 1970

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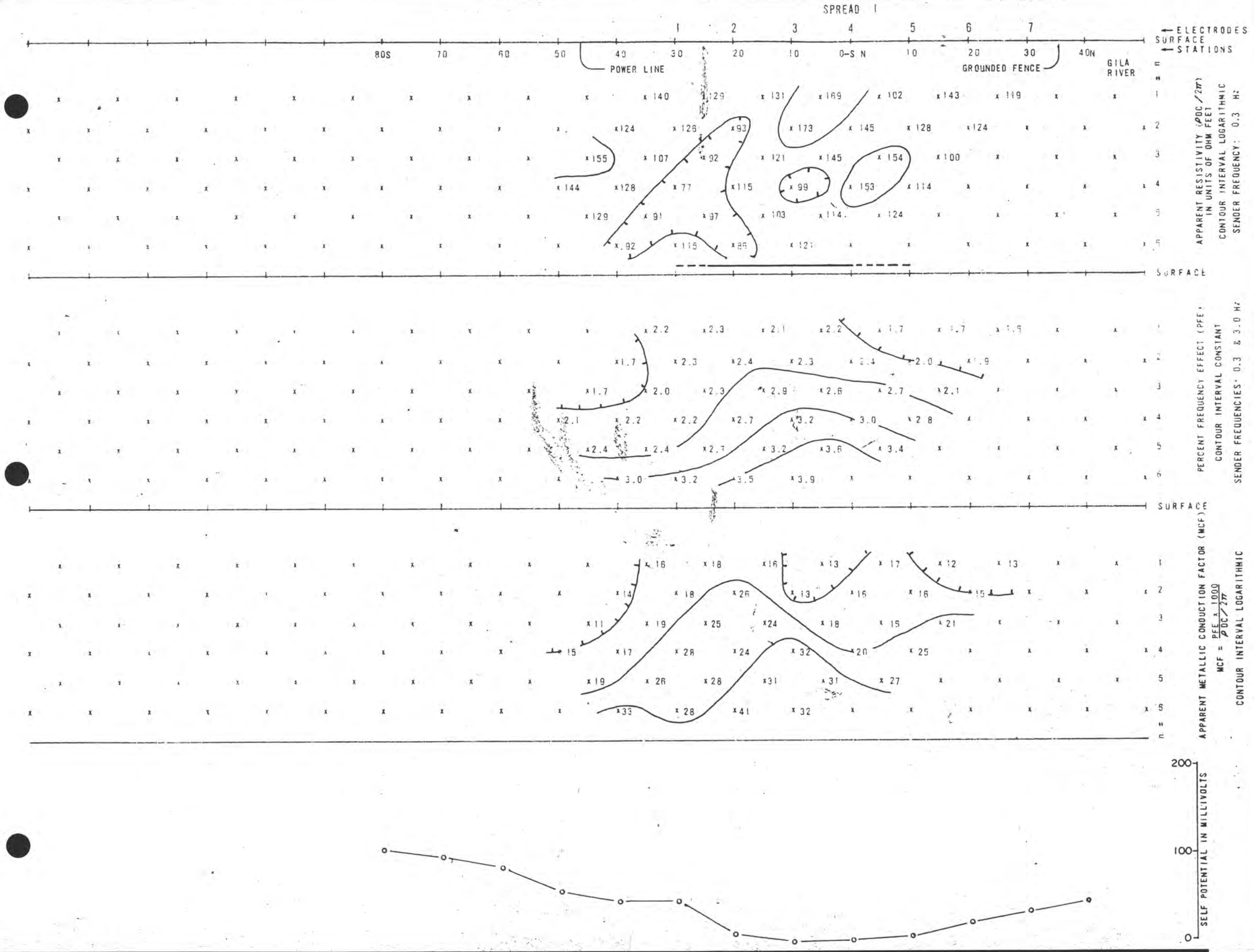

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INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

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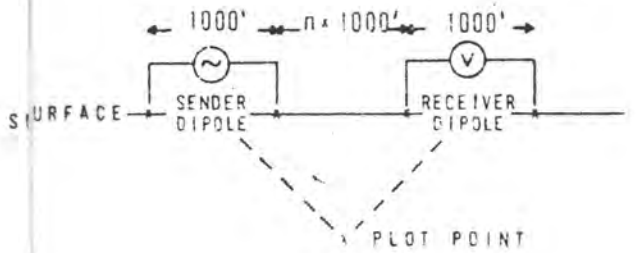

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DATE
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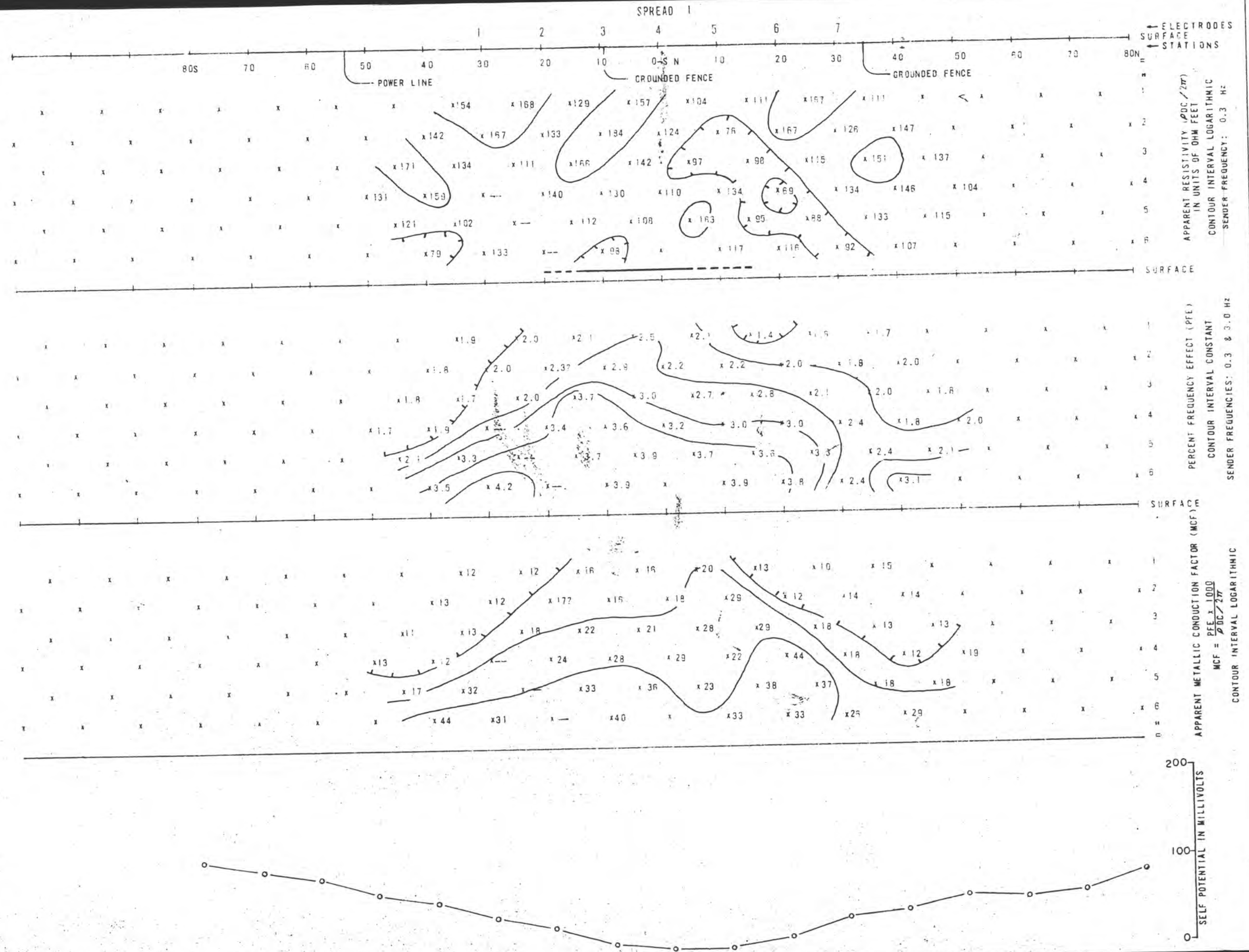

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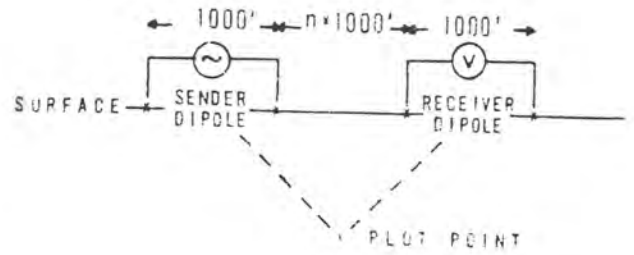

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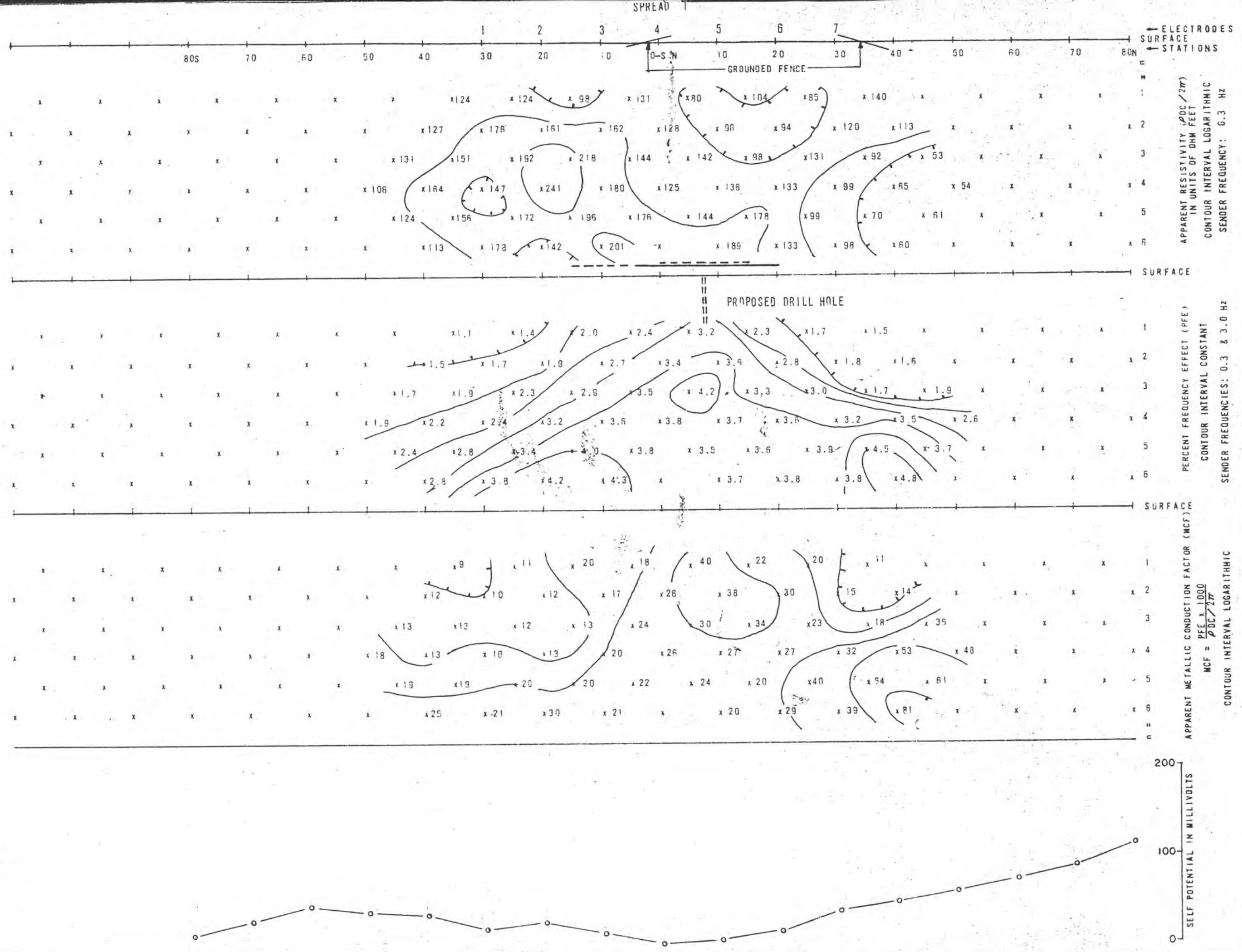

516-70

LINE NO.
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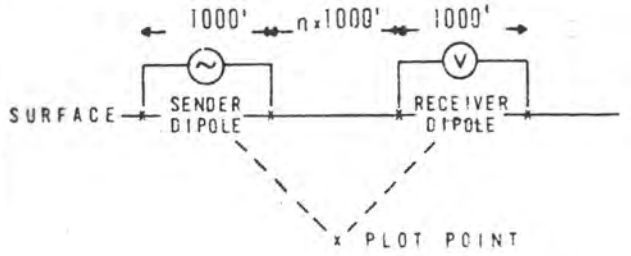

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LINE NO.
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SPREAD(S)
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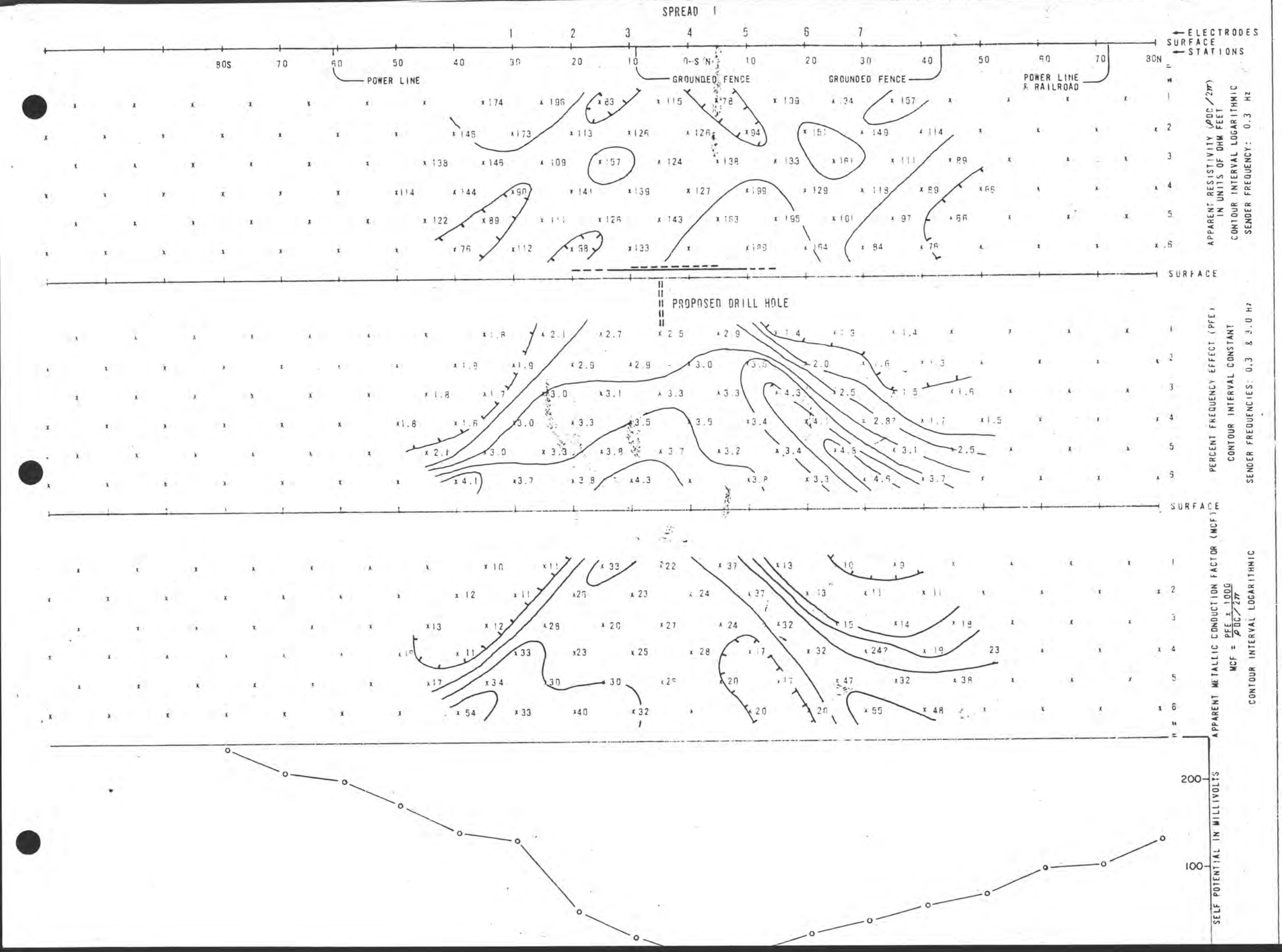

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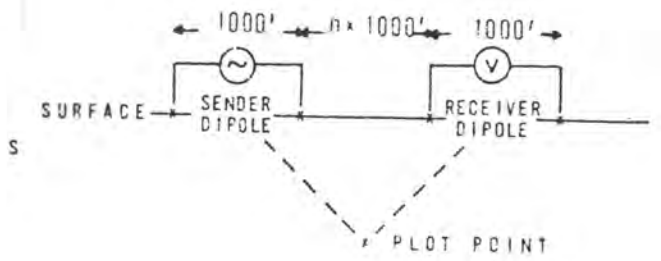

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5-6-70

LINE NO.
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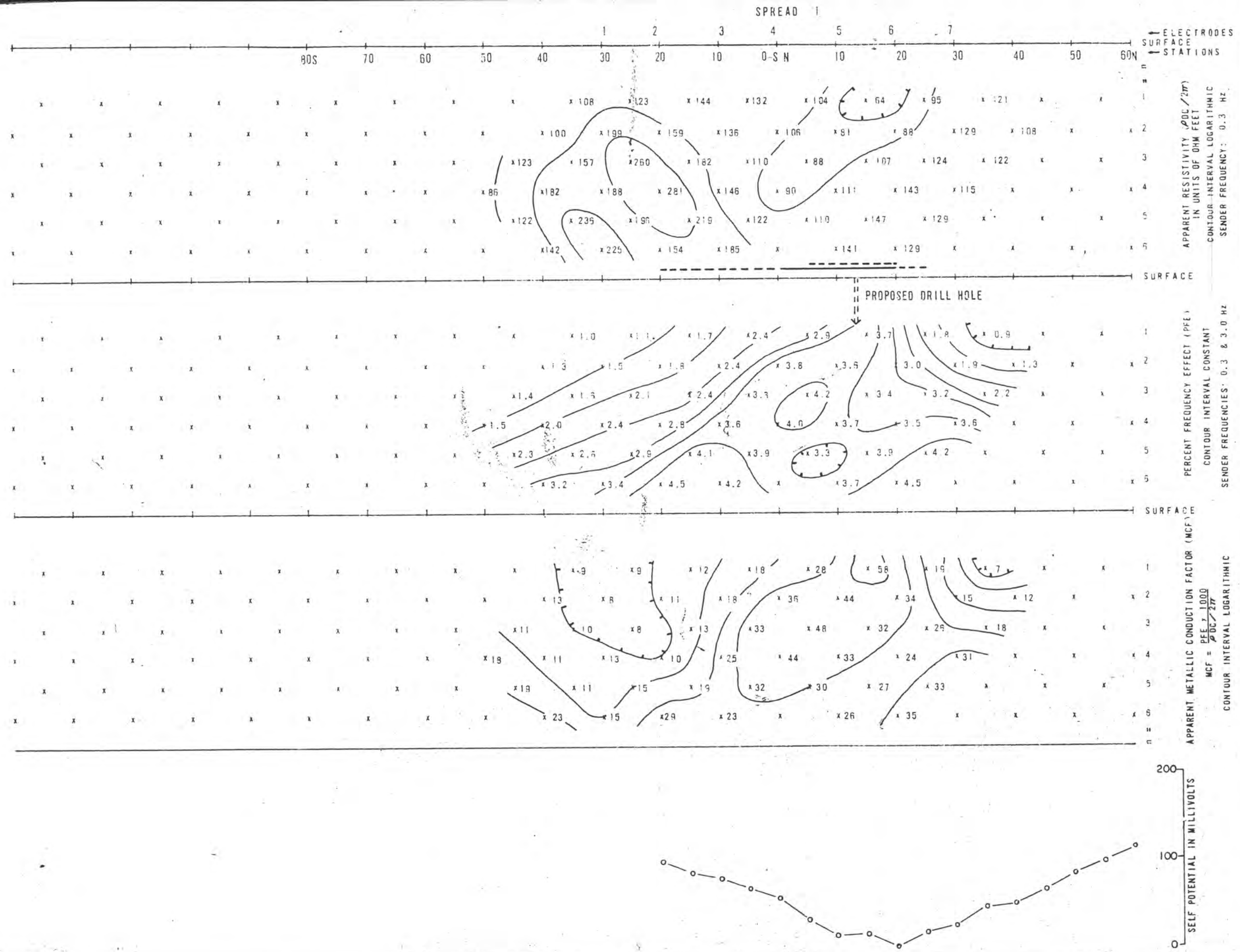

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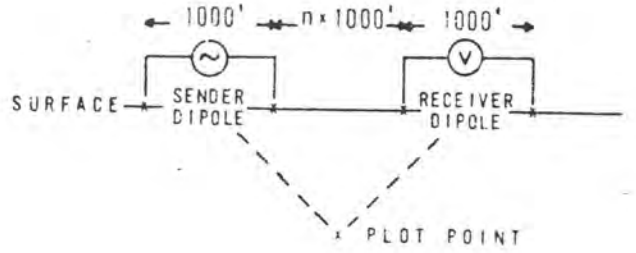

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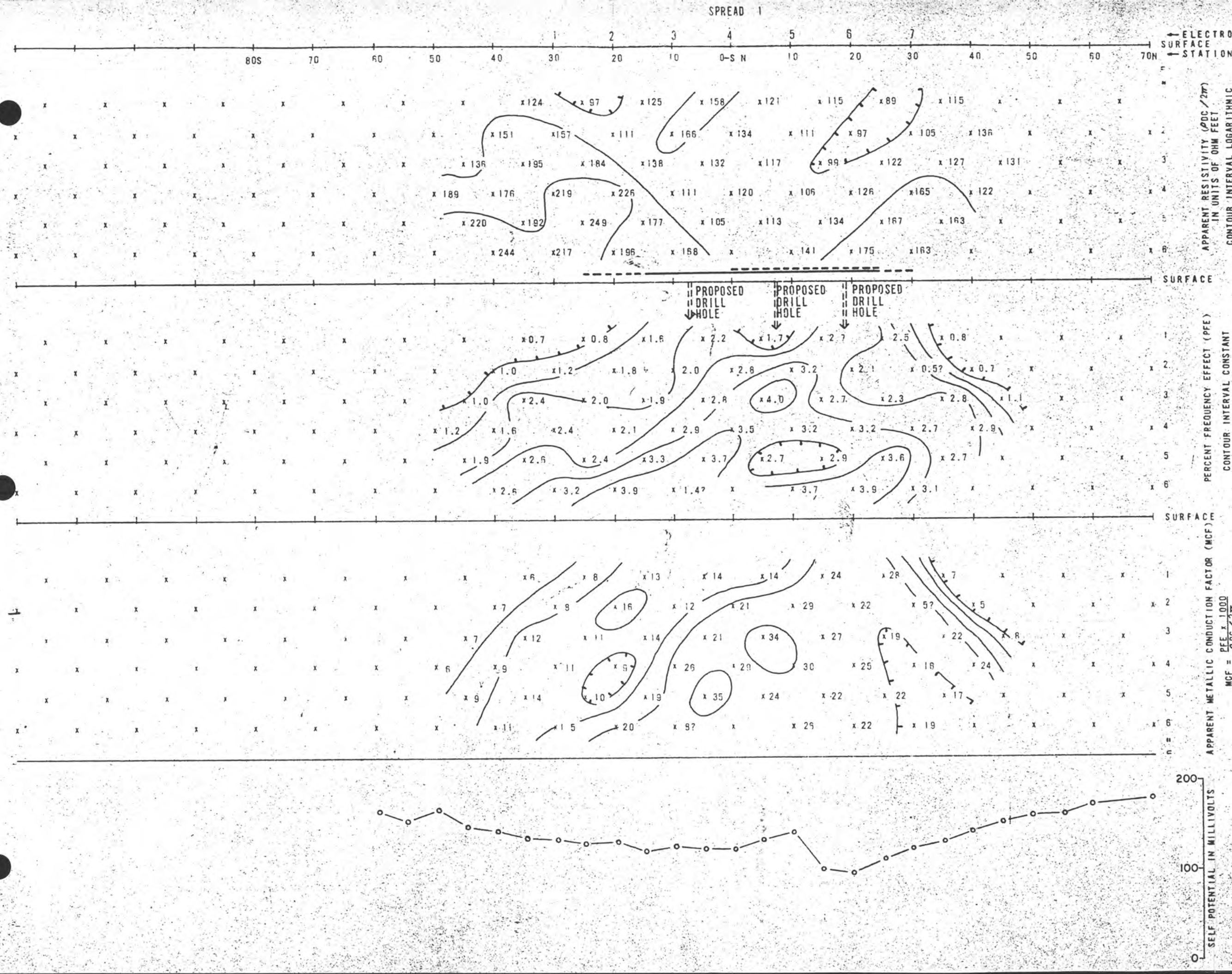

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INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

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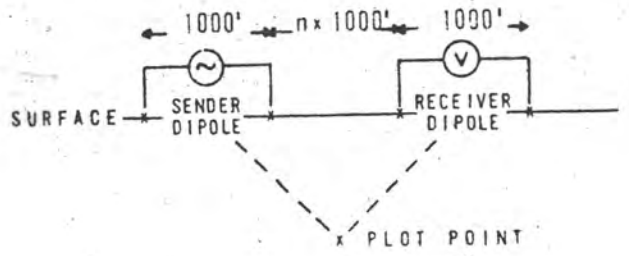

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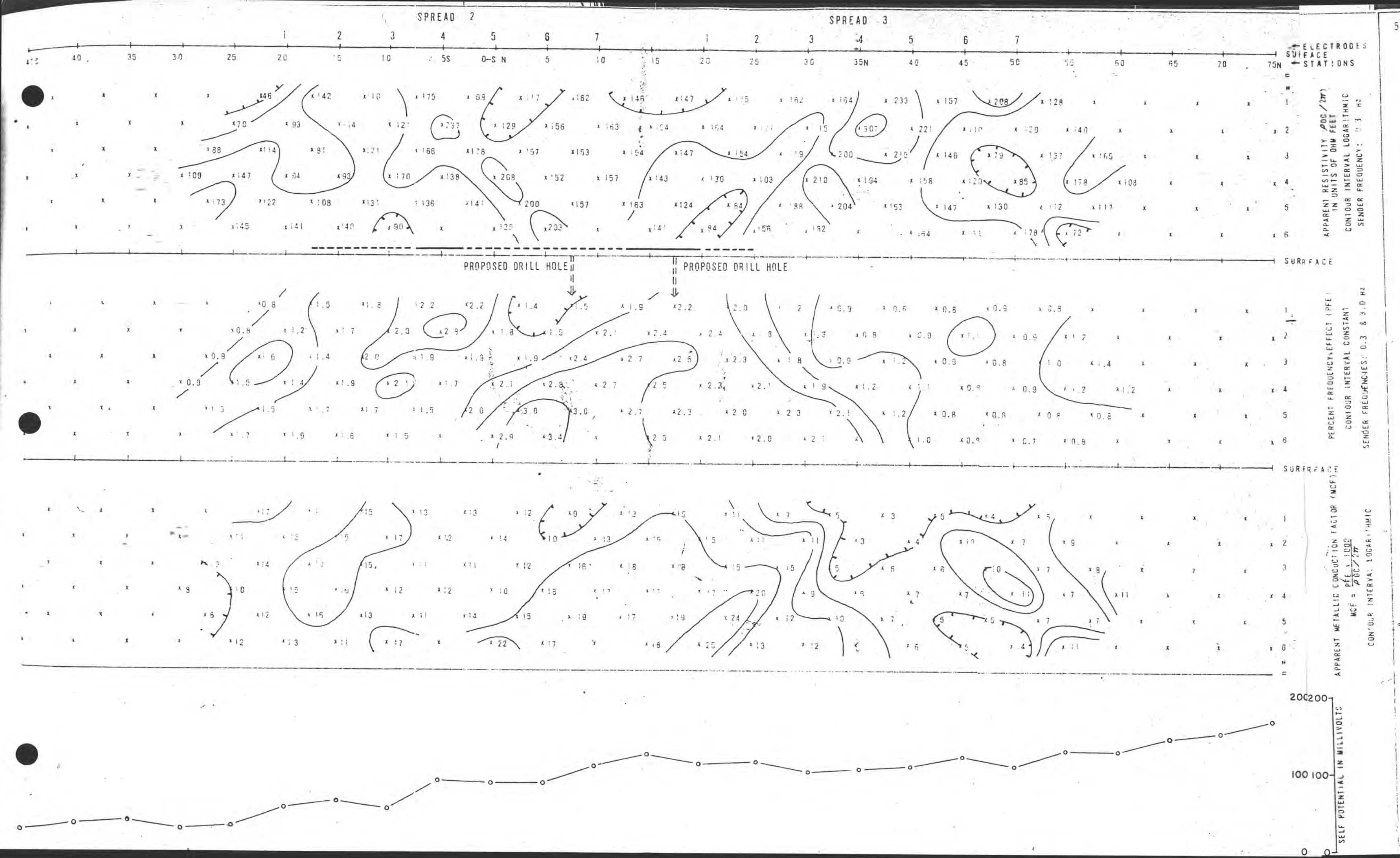

516-70

LINE NO. 1-OW

SPREAD(S) 2 & 3

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

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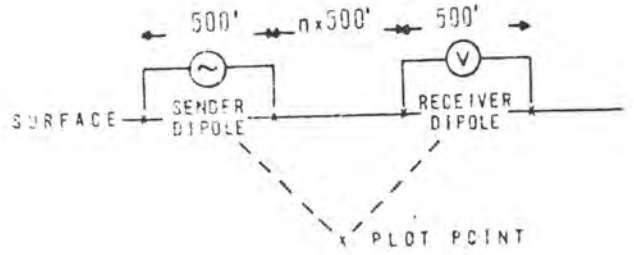
DIPOLE DIPOLE ELECTRODE ARRAY



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DATE
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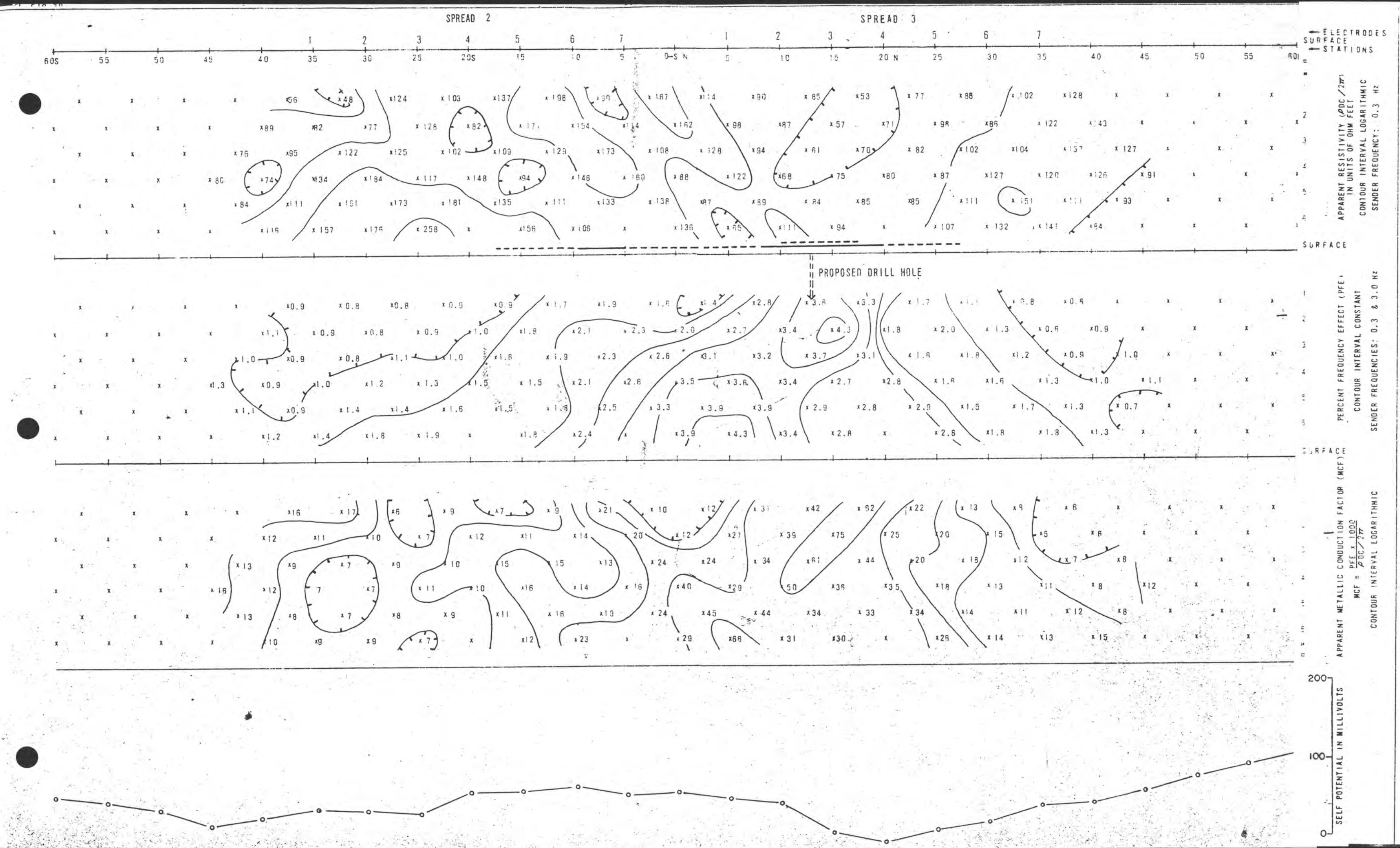

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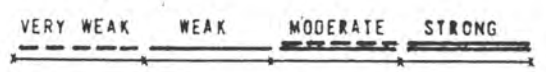
RELATIVE ANOMALY STRENGTH



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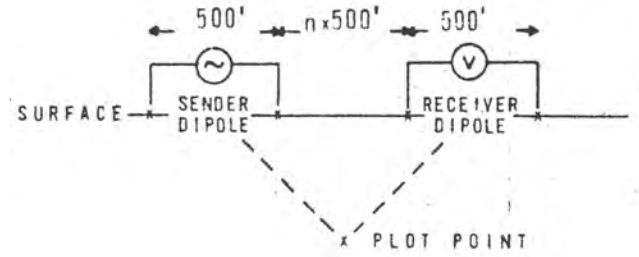

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516-70

LINE NO.
40W
SPREAD(S)
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INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET
for
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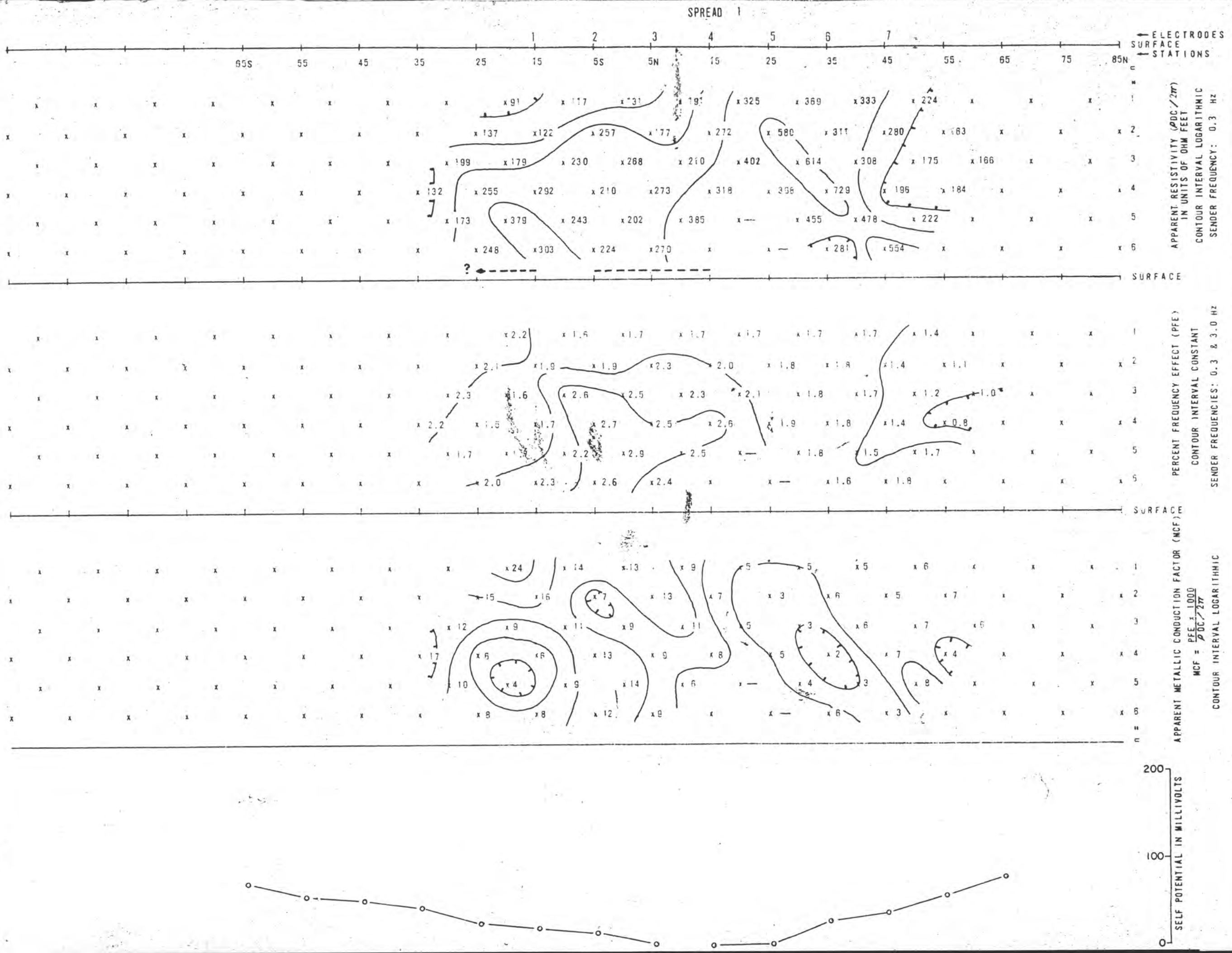

RELATIVE ANOMALY STRENGTH

VERY WEAK | WEAK | MODERATE | STRONG

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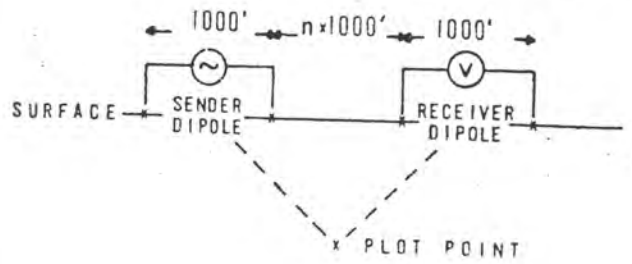

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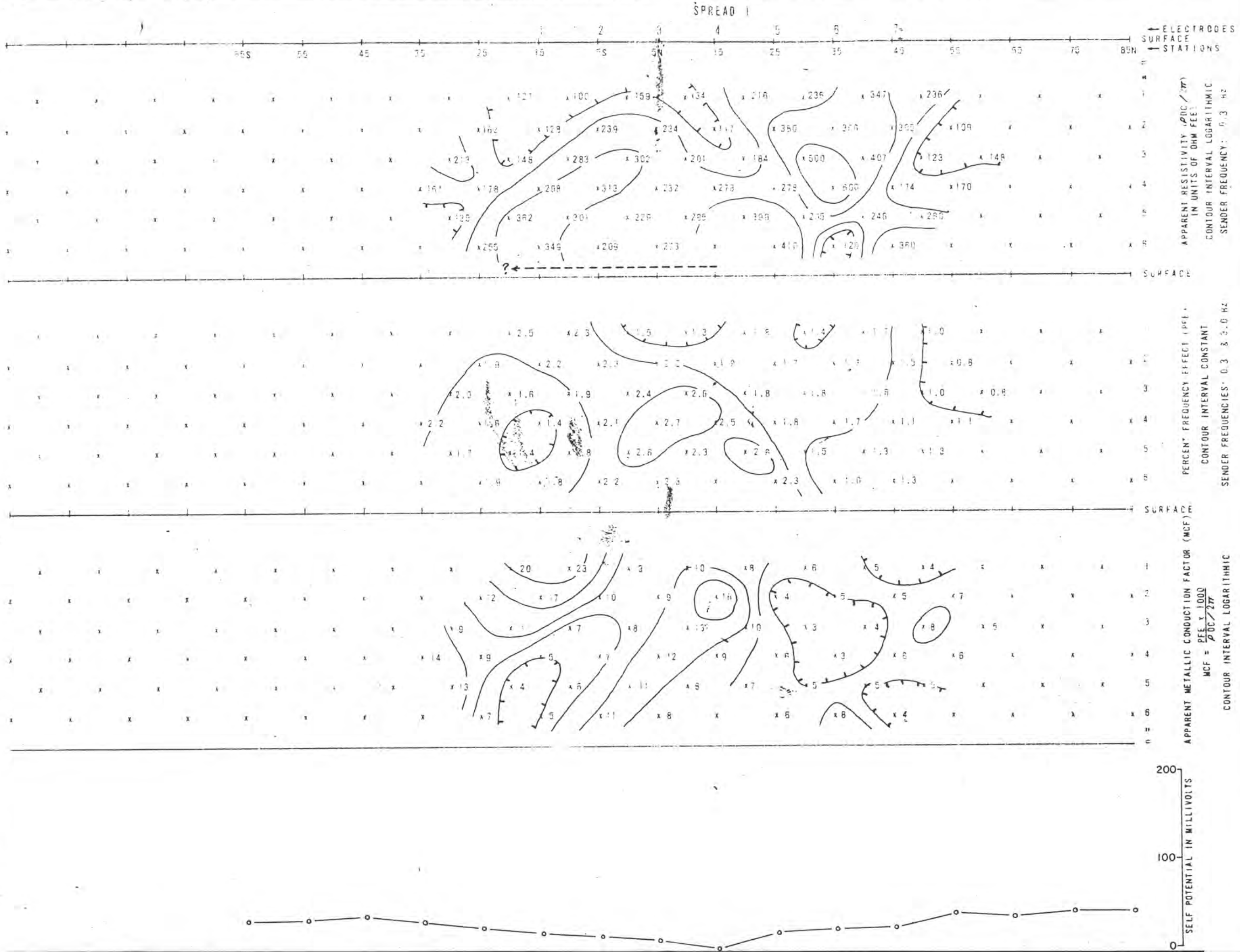

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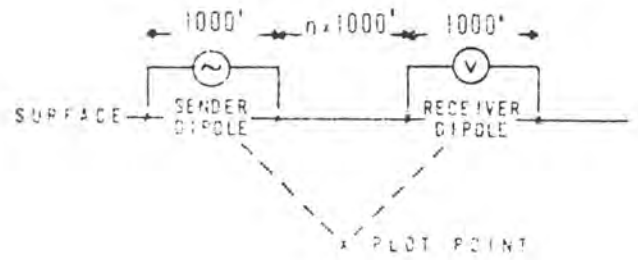

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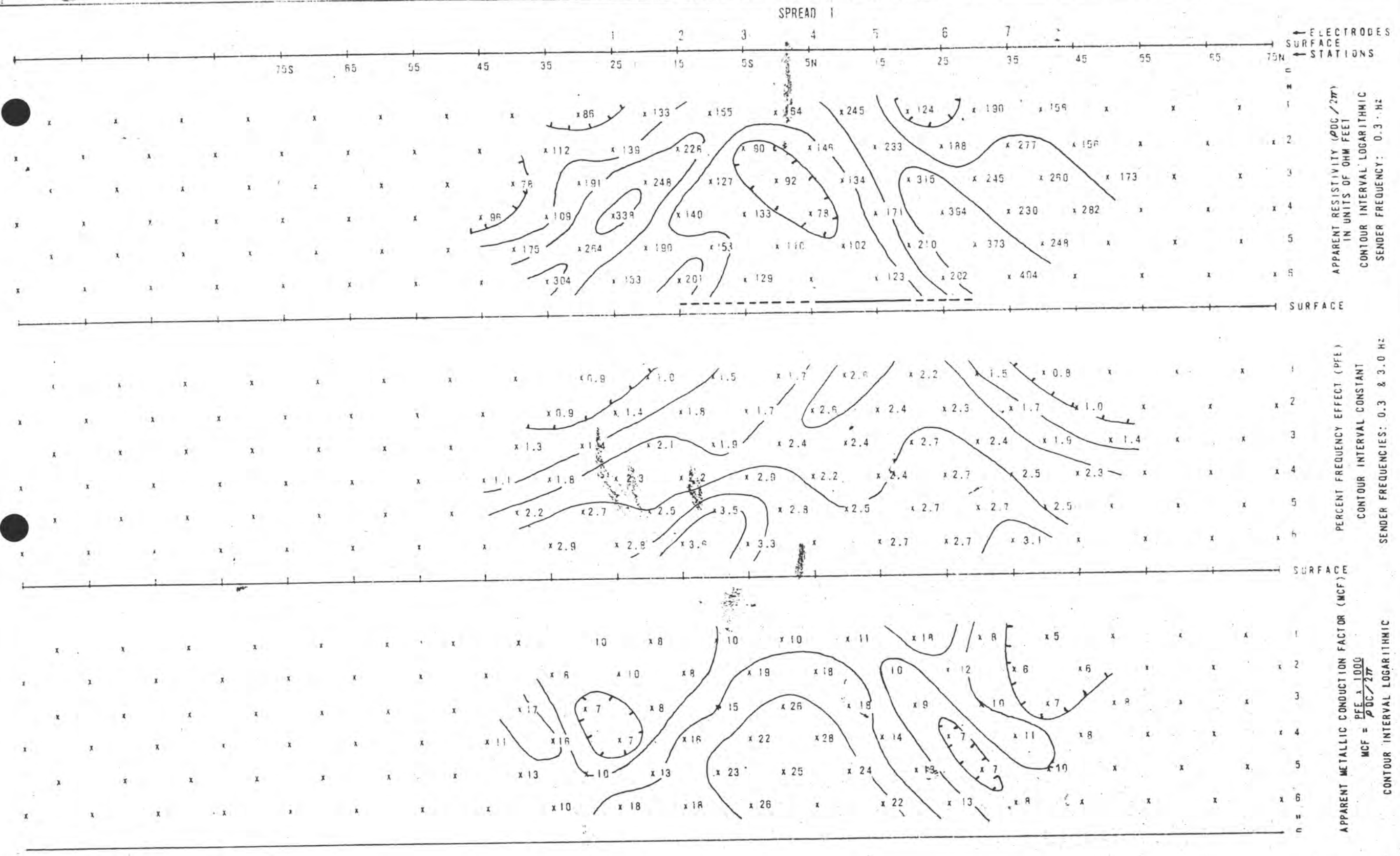

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20W
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INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

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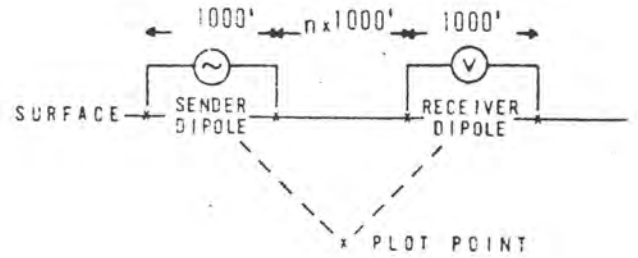

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5/6-70

LINE NO.
30W
SPREAD(S)
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INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

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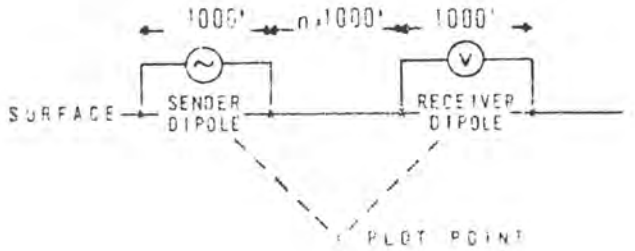

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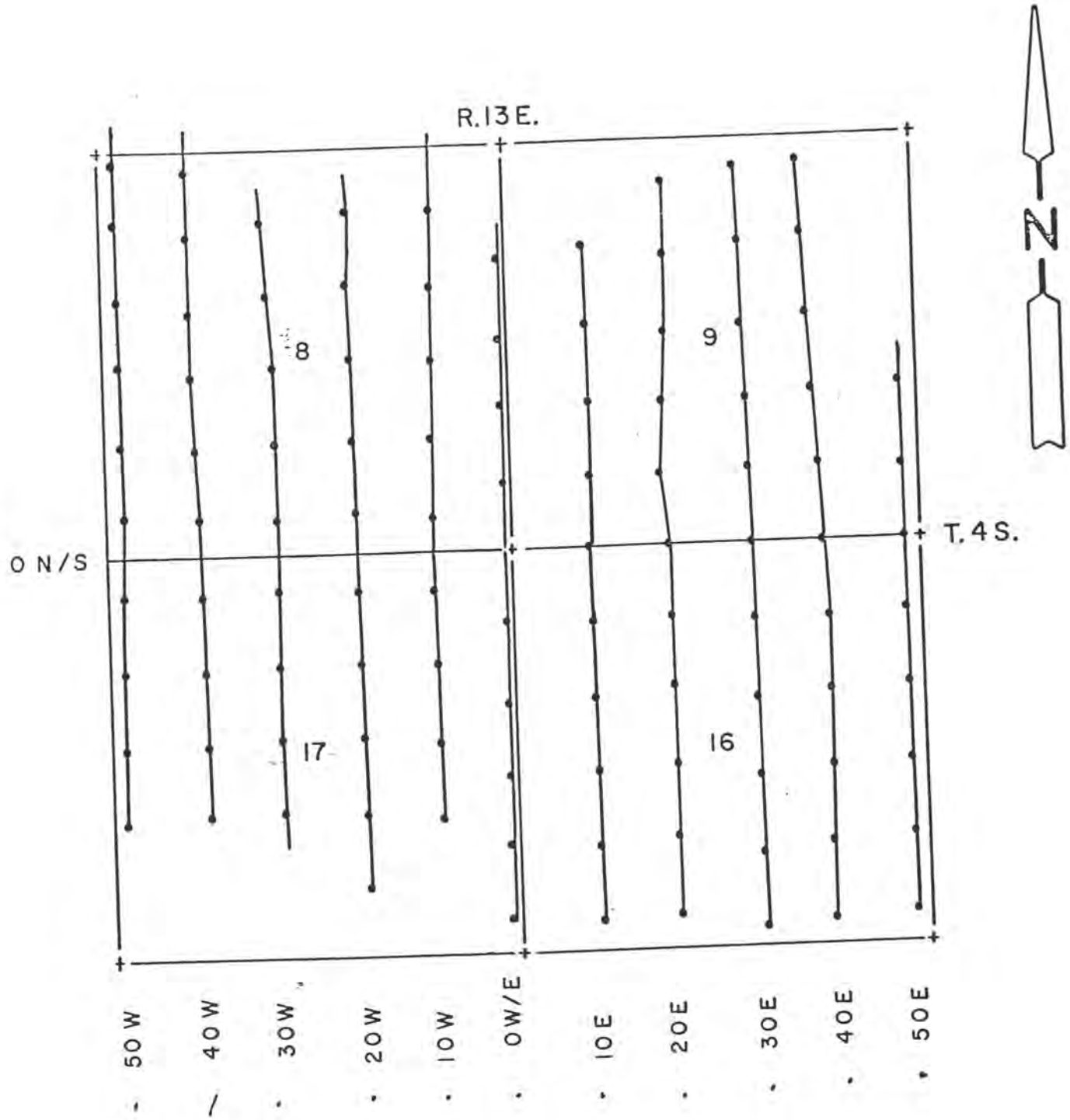
FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE 1:24,000
DATE 29 JAN 74
DRAWN BY J.P.V.



TITLE KELVIN PROSPECT - INDUCED POLARIZATION LINES

SKETCH NO. 5

Heinrichs Geoexploration [illegible] for [illegible] - MAY 1970

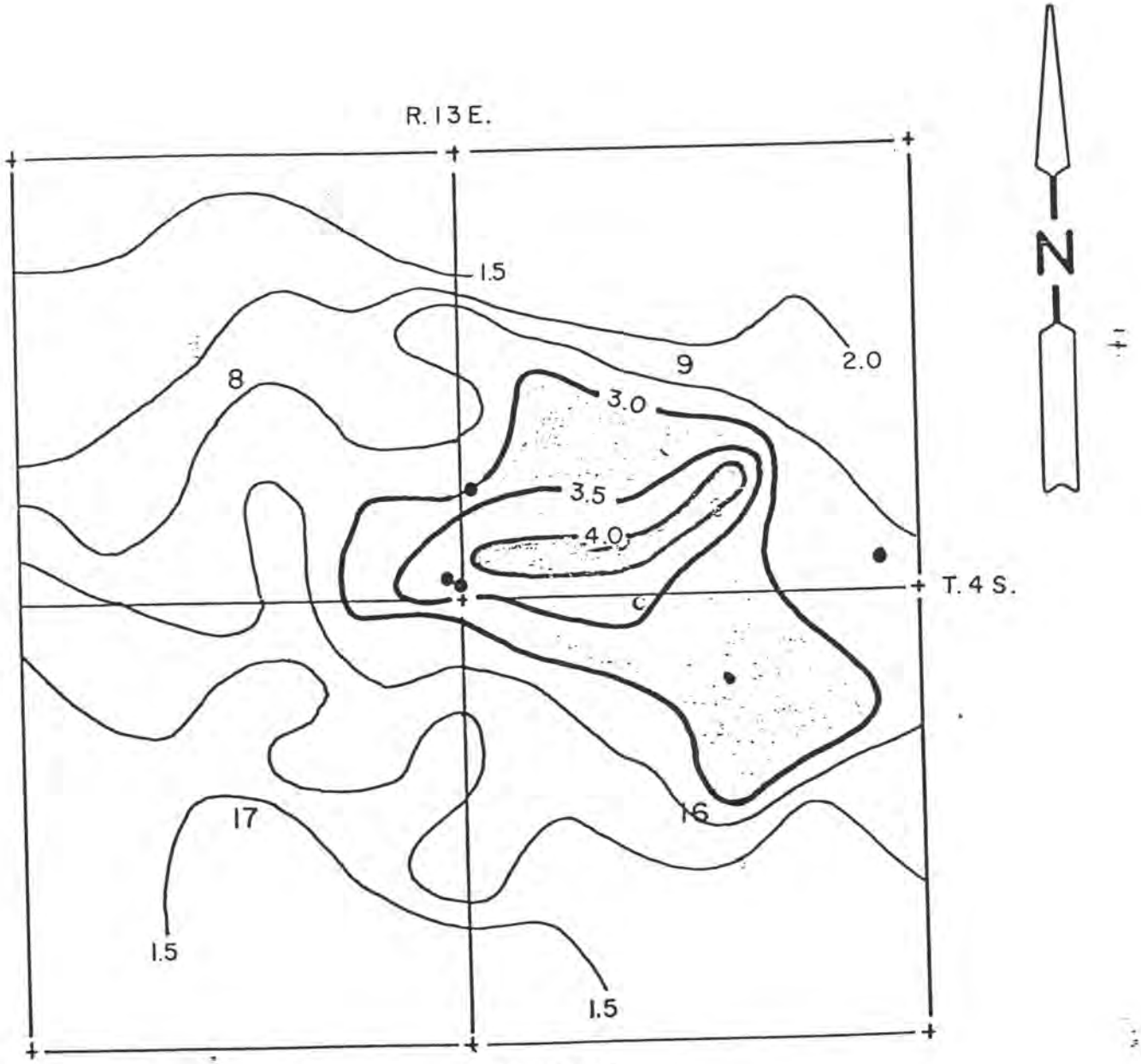
FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE 1:24,00

DATE 29 JAN 7

DRAWN BY J.P.V



contour interval = 0.5 P.F.E.

● = existing drill hole

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT AT "n"=3 SKETCH NO. 7

(P.F.E. over 3% in red)

FILE NO.

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DATE 31 JAN 74
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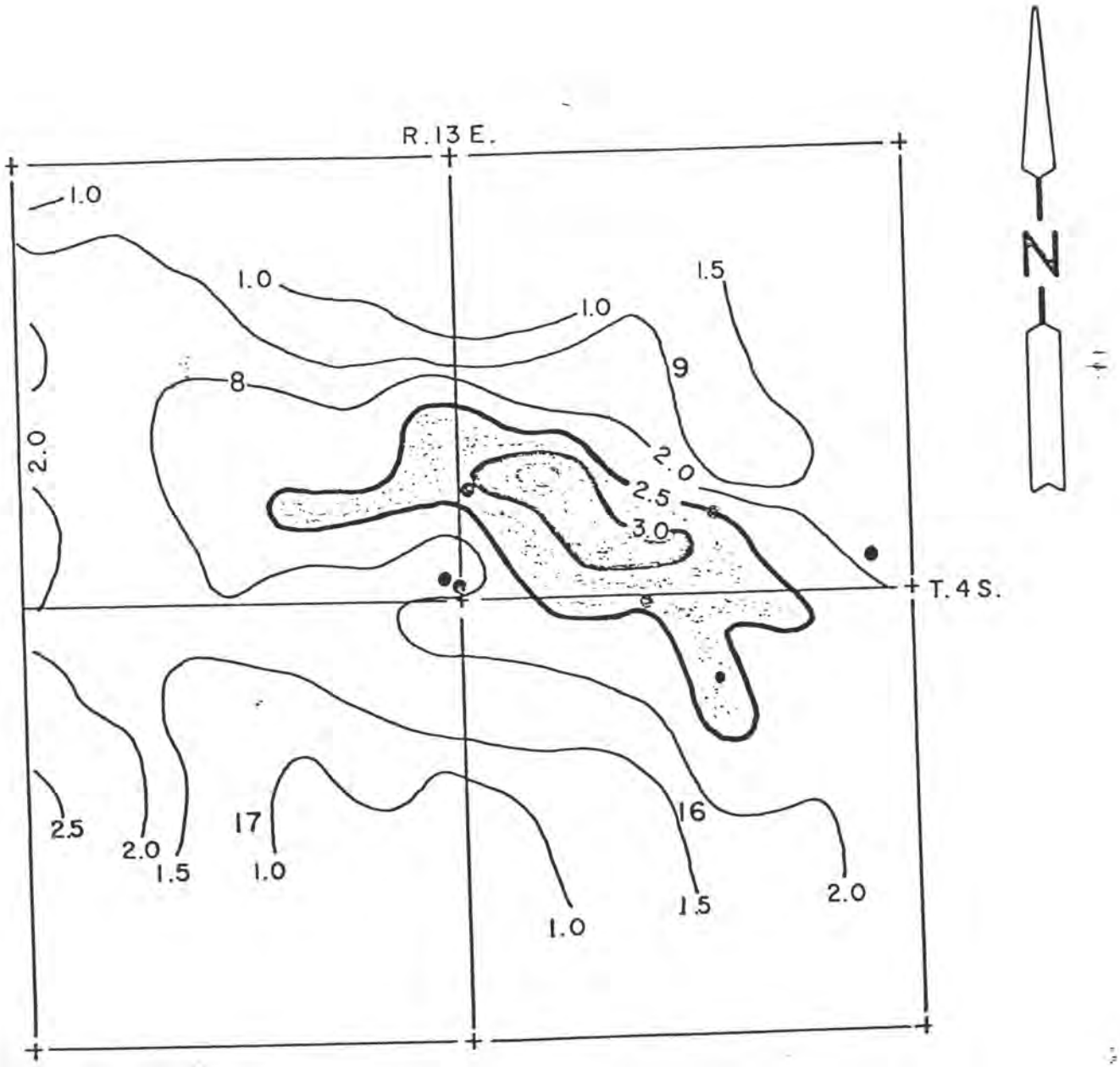

contour interval = 0.5 P.F.E.

● = existing drill hole

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(P.F.E. over 2.5 % in red)

FILE NO.

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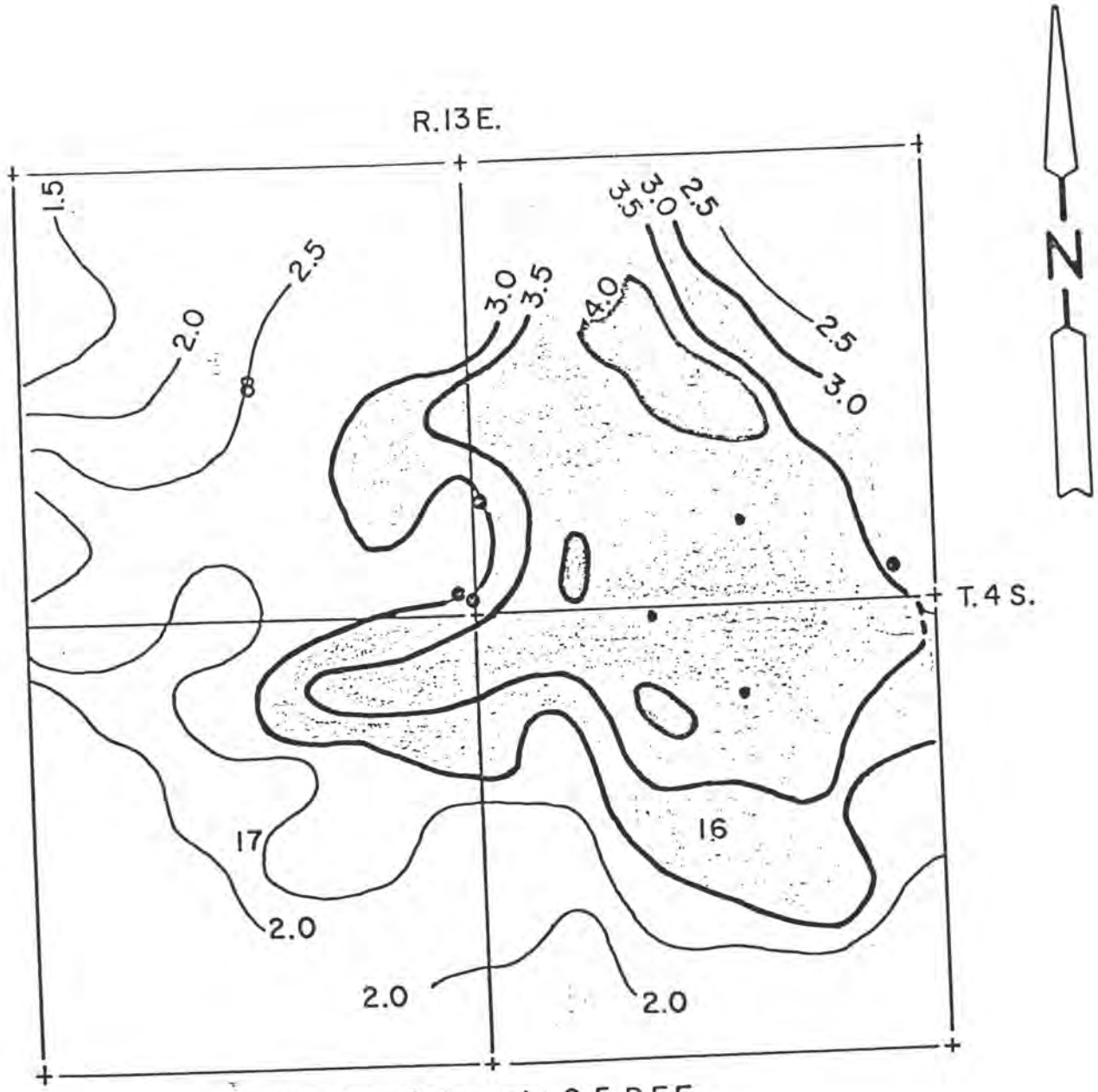
DATE 30 JAN 74
DRAWN BY J.P.V.



contour interval = 0.5 P.F.E.

= existing drillhole

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT AT "n" = 5 (P.F.E. over 3.0 % in red)

SKETCH NO. 8

TIPPERARY LAND AND EXPLORATION CORPORATION

GEOLOGY OF THE KELVIN PROSPECT
T4S R13E PINAL COUNTY
ARIZONA

BY
TIPPERARY RESOURCES CORPORATION

W. P. Zelinski - Geologist
David Brown - Geologist
C. R. Williams - Exploration Manager

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Note: 3 colored topo maps in pocket showing geology by Zelinski & Brown date: June 18, 1970.

Appendix B ?

No drill hole locations

ILLUSTRATIONS

FIG.

1 LOCATION MAP - RAY-KELVIN AREA, PINAL CO. ARIZONA . . . 2

2 PROSPECT TOPOGRAPHIC MAP SHOWING CLAIM BOUNDARIES . . . 4

PLATES

1 GEOLOGIC MAP OF THE KELVIN PROSPECT

2 DRILL HOLE NO. 1 SAMPLE LOG

3 DRILL HOLE NO. 2 SAMPLE LOG

ABSTRACT

The Kelvin Copper-Molybdenum Prospect located in Pinal County, Arizona, has been the subject of an extensive geological and geophysical program designed to investigate the economic potential of copper-molybdenum mineralization. Review of both local and regional geological relationships points out numerous similarities between structure, petrology, and mineralization at Kelvin and Kennecott Copper's Ray open pit mine five miles to the northeast.

Results of geophysical and geological investigations show the presence of an anomalous zone of sulfide mineralization trending approximately east-west across the prospect. Tipperary drilled two holes on the property, which were located on the basis of surface mineralization and prior geophysical observations (before completion of geophysical surveying). Mineralization in both holes is submarginal to marginal but several short intervals contain ore grade mineral. The leached character of the granite host in the drill holes combined with increasing amounts of sulfide mineralization at increasing depth in Drill Hole 2 may be indicative of an enriched zone at greater depth. Support for this hypothesis are the numerous shows of chalcocite pseudomorphism after pyrite and the highly leached and altered nature of the granite.

The geophysical anomaly tends to be confined between two bordering Laramide intrusives. The northern boundary of the anomaly subparallels a large diorite porphyry dike and the southern boundary parallels an apophysis of a quartz monzonite stock. Because of the restriction of significant mineralization to the main anomalous zone it is possible that the mineralization is the result of hydrothermal migration upward through the basement weakness zone created by intrusion of the monzonite stock and confinement of solutions by the monzonite barrier on the south and the diorite porphyry dike to the north.

Additional exploratory core tests are needed to ascertain the economic potential of the prospect as recommended in the geophysical report.

INTRODUCTION

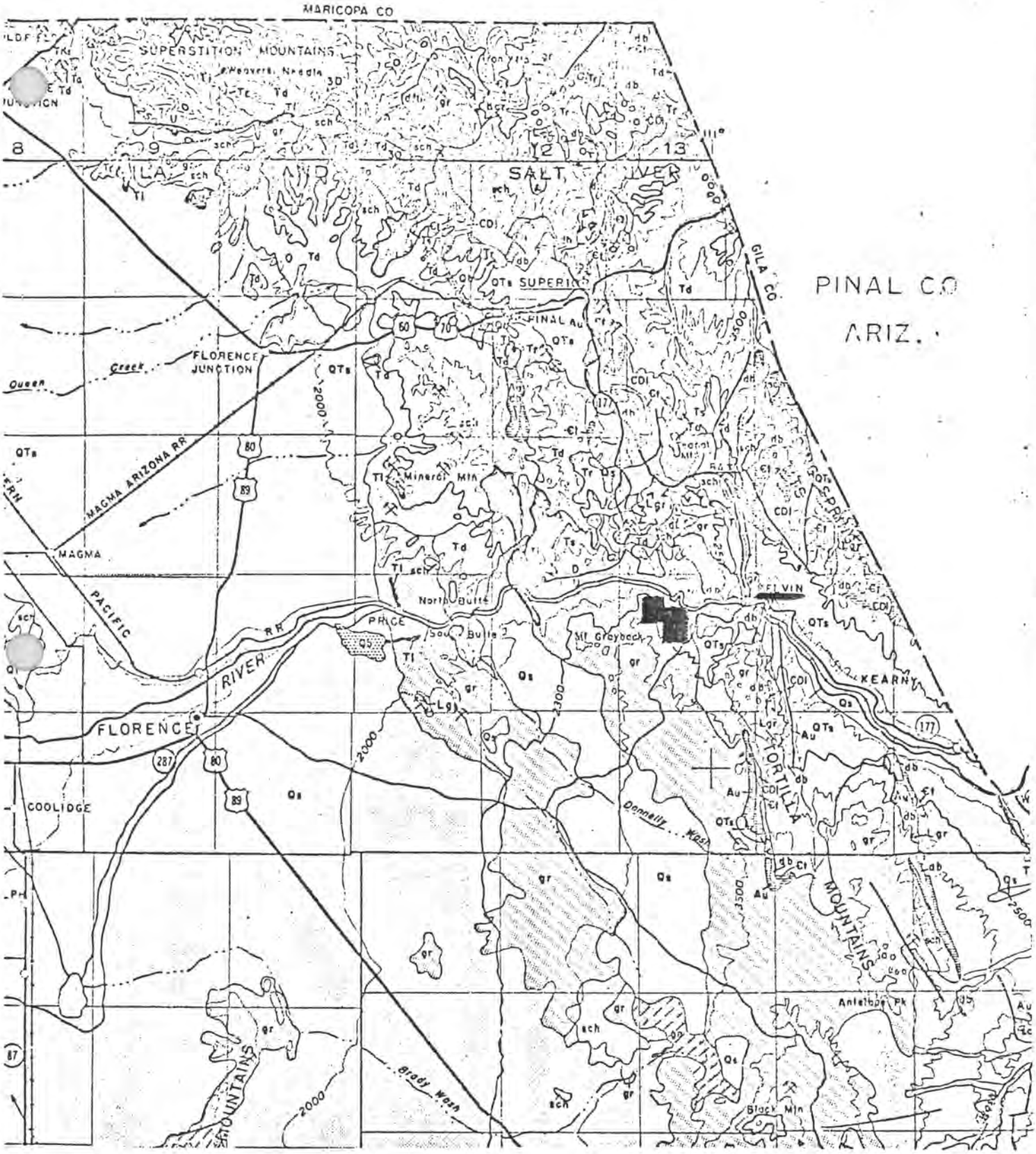
The Kelvin Copper-Molybdenum Prospect was acquired by Tipperary Resources Corporation in January, 1970 through negotiations with claim owners and prospecting permitees.

An extensive preliminary exploratory program was initiated to ascertain the extent of mineralization in the Kelvin area. A thorough geologic mapping program was initiated to run concurrently with an extensive induced polarization survey and drilling of two holes. This report is a summary of pertinent geological data derived from the current study and a review of the regional geology and ore deposits.

LOCATION AND ACCESSIBILITY

The Kelvin Prospect is located in the Riverside Mining District, also known as the Mineral Creek and Kelvin Mining Districts. (Fig. 1.) The prospect consists of 33 unpatented lode mining claims, one patented mining claim known as the Zelleweger Claim and two state sections. All of the property is in a contiguous block located in Sections 8, 9, 10, 16 and 17, Township 4 South, Range 13 East of the Gila and Salt River Base and Meridian, Pinal County, Arizona as shown on Figure 2. Quit claim deed to additional claims which are not contiguous with the main group have also been obtained.

The property is located five miles south of Kennecott Copper's Ray open cast copper mine which is currently mining 110,000 tons per day. Access to the prospect is via State Highway 177 from Superior,



LOCATION PLAT

KELVIN PROSPECT

Cu – Mo

Arizona, 15 miles south to Kelvin where an improved gravel road extending from Kelvin to Florence, Arizona, intersects Highway 177. This road is followed six miles to the A-Diamond Ranch Road and Southern Pacific Railroad's access turnoff. The railroad access road is followed a distance of two miles to the entrance of Johnson Wash from where a mine road extends south one mile to the prospect.

CLIMATE AND VEGETATION

Temperatures range from a minimum of approximately 20 degrees during the winter months to a maximum of 120 degrees during extreme periods in the summer. Rainfall is scant, averaging between 10 and 15 inches per year. Excessive periods of rainfall create hazardous conditions in the numerous gullies and washes in the prospect area and flash flooding conditions occur in numerous areas between Kelvin and the prospect area.

Vegetation consists predominately of saguaro and cholla cacti. Ocotillo, creosote and paloverde are also common as is mesquite in the lower topographic areas.

CLAIM DESCRIPTIONS AND OWNERSHIP

Tipperary has acquired through a purchase agreement a total of 33 unpatented mining claims in a contiguous block in Sections 8, 9 and 17, Township 4 South, Range 13 East. The relative position of these claims is shown on Figure 2. All of the claims have been

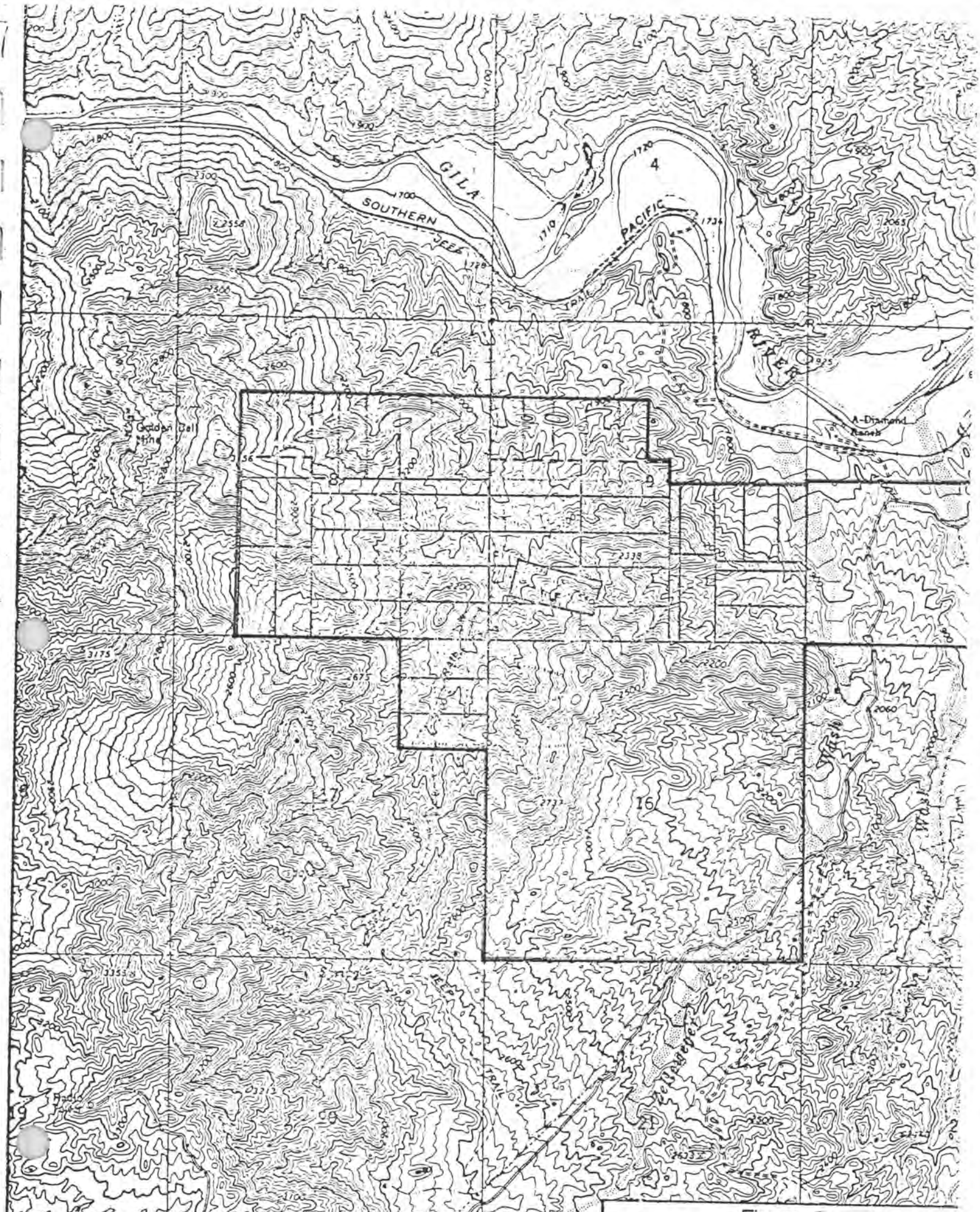


Figure 2
TOPOGRAPHY & CLAIM MAP
KELVIN PROSPECT

surveyed by Carl Weckerly and Associates, Registered Land Surveyors, Chandler, Arizona. In addition to the unpatented claims mentioned above, one patented claim, known as the Zelleweger Claim was acquired to complete the block so that no internal voids exist. Two State of Arizona sections (Nos. 10 and 16) were acquired for additional coverage. Both sections are held under prospecting permits.

HISTORY

Mining in the Ray area is reported to have begun during the early 1880's at which time many claims in the general area were located and prospected. Although exact records are not available, prospecting in the Kelvin area is thought to have been initiated during the 1910 to 1920 decade. Several old claim papers dating back to 1917 have been found and are thought to represent the earliest stages of exploration in the prospect area. The Zelleweger claim was patented in 1924 and is the most extensively developed property within the prospect boundary. Approximately $40,000 in gold, copper and zinc were reportedly mined from the property in the 1920's and early 1930's. A. H. Johnson located several claims in the area in 1933 (Black Copper Claims) and prospected numerous surface shows for copper and gold. Numerous other shallow pits and tunnels were worked about this time by other prospectors but no large accumulations were found. Johnson continued prospecting the area and located several encouraging shows of molybdenum and copper oxides. The filing of additional mining claims during 1953 through 1957 and the subsequent sinking of two sixty foot shafts on the molybdenum mineralization were the last attempts at small scale production on the prospect.

Inspiration Copper ran two IP lines across the property during 1967 and Minbanco Corporation acquired the property for an exploratory program during 1968-1969.

Minbanco drilled nine exploratory holes on the property from September to December of 1968. Drilling procedures and sample collecting were inadequate for complete evaluation. Results from preliminary induced polarization lines pointed out anomalous sulfide concentrations which were only partially tested by drilling. A more complete description of the work done and results obtained is compiled in Appendix A.

Tipperary acquired the prospect in December of 1969 and initiated a detailed exploratory program utilizing geologic, geochemical and geophysical techniques. Geologic mapping was done on a 1" = 200' horizontal scale using plane table and alidade. Both fracture system and mineralization overlays were prepared to be superimposed upon the basic geologic map. All old mine workings were mapped and systematically sampled and a petrographic examination of the various rock types was initiated by the Colorado School of Mines Research Institute. Results of the School of Mines research is presented in Volume III.

A detailed geophysical survey program was designed for the Kelvin area with the technical assistance of Heinrich's Geoexploration of Tucson, Arizona. A north-south grid system was designed to evaluate the postulated mineralization by utilizing induced polarization techniques. Both 500 foot and 1000 foot dipole arrays were used. A complete report of all geophysical survey work conducted by Heinrich's is presented in Volume II.

GENERAL GEOLOGY

A general review of the basic geology of the Ray quadrangle and Tortilla Mountains is necessary to provide an adequate background for the more detailed study of the Kelvin prospect area. Numerous parallelisms and similarities between surficial geology of the Ray mine area and the Kelvin prospect area can be noted.

Physiographically the Ray - Kelvin area may be classified as lying in the Mountain Region of Southeast central Arizona. The mountain region is characterized by numerous short relatively parallel mountain ranges, few of which exceed fifty miles in length. The Ray-Kelvin area is traversed by two of the typical ranges in a southeast to northwest direction.

The Dripping Spring Range, six miles northeast of the Kelvin Prospect, east of the Ray open pit presents a complicated picture of numerous small fault blocks composed mostly of Paleozoic sediments and irregular intrusives. Southwest of the Dripping Spring Range is the Gila River valley which is characterized by extensive thicknesses of Quaternary Gila conglomerate. The Tortilla Range marks the southwestern edge of the mountain region. The higher portions of the range consist mainly of Pre-Cambrian granite with younger intrusives flanked by sharp narrow ridges of the lower Paleozoic sedimentary formations on the east and a gentle slope to the west. The Kelvin Prospect is situated on the northern portion of the Tortilla Range.

The geologic section in the Ray - Kelvin area consists of Pre-Cambrian Pinal Schist and granitic rocks overlain by the Apache Group, a sequence of Scanlan conglomerate, Pioneer shale, Barnes conglomerate, Dripping Spring quartzite, Mescal limestone and basalt. Succeeding the Apache group is the Troy quartzite, Martin limestone (Devonian), Escabrosa limestone and undifferentiated Cretaceous limestones. Numerous diabase sills, dikes and irregular intrusives were emplaced during late Paleozoic or early Mesozoic time.

To the south of the Ray - Kelvin area is a sequence of andesite tuff, breccias and flows cut by andesitic to monzonitic dikes. Eruption of the andesites was followed by an intrusive cycle of quartz diorite, granite, quartz monzonite porphyry, and quartz diorite porphyry during the Laramide. The granitic and monzonitic rocks are closely related to the copper deposits of the general area. Late Tertiary time is represented by extensive dacite flows which have been broken by faulting and erosion. The Gila conglomerate of Quaternary age occupies a large portion of the present day Ray - Kelvin area and has been deformed by extensive faulting and erosion.

The relationships of the various intrusive rocks in the Ray - Kelvin area have been studied in detail by the U.S.G.S. (Professional Paper 115) and are summarized below:

<u>Precambrian Granite (Biotite Granite)</u> - according to the U.S.G.S. this rock type crops out over most of the Tortilla Range and is the dominant rock type of the Tortilla

batholith. Composition of the granite varies slightly but is principally potash feldspar phenocrysts in a ground mass of anhedral plagioclase and quartz with moderate amounts of biotite.

Mesozoic Diabase - The diabase intrusives in the vicinity of Ray and Kelvin intrude all rock types up to and including the Cretaceous limestones. It is conceivable, however, that repeated intrusions of diabasic magmas during separate geologic periods account for the irregular and apparent dissimilar nature of many of the intrusions. Petrographically the diabase is a dark gray to black holocrystalline medium grained to aphanitic rock with accessory magnetite and large tabular plagioclase crystals. Younger diabase dikes cut across some older diabase and are typically the finer grained variety. Mineralogically the diabase is composed of labradorite, augite, olivine and accessory amounts of biotite, apatite, titanite and magnetite.

Quartz Diorite - Quartz diorite dikes and irregular intrusive bodies crop out in numerous areas within the Ray - Kelvin vicinity. The rock is light to dark gray, of fine grained texture and normally consists of hornblende, augite, and biotite crystals in a mass of euhedral plagioclase with anhedral orthoclase, interstitial quartz and accessories of titanite, magnetite and apatite. The quartz diorite is the oldest of the Tertiary intrusives.

Quartz Monzonite Porphyry - Several small irregular intrusions are recognized west and southwest of Ray. Most of the Monzonite porphyry is associated with copper mineralization. Petrographically the rock is light-gray to white and consists of plagioclase phenocrysts and a medium grain groundmass of quartz, orthoclase and occasional biotite. Age of the monzonite is Tertiary.

Quartz Diorite Porphyry - Numerous dikes, sills, and irregular intrusive bodies crop out in the Ray - Kelvin area. Ore deposits at the Christmas mine appear to be genetically dependent upon the quartz diorite porphyry.

Petrographically the rock varies radically in both texture and composition but is typically exemplified by the larger intrusions as a light gray speckled rock with phenocrysts of white plagioclase, black biotite, or quartz in a fine groundmass of the same composition. Most of the dikes exposed show extreme textural differences between the central core and outer fringes.

Several other rock types occur in the Ray vicinity but are not pertinent to the area under study or to the ore deposition in the area.

STRUCTURE

As described previously, this area is characterized by north-northwest-trending mountain ranges. Regionally the fault systems parallel the mountain ranges. Most faulting in the area is normal, but thrust and reverse faults are also represented. Repeated movement of the prominent faults dates back to the Precambrian.

RAY ORE DEPOSITS

A review of the mineralization at Ray is provided for background information and because of its proximity to the Kelvin Prospect.

Disseminated copper mineralization at Ray covers an area roughly two miles square and at least 3000 feet in its vertical dimension. The ore body is a combination of supergene enriched ore which occurs as an irregular blanket of considerable thickness and large zones of copper oxides in the eastern portion of the Ray pit.

Ore minerals consist of hypogene pyrite, chalcopyrite, molybdenite, and bornite with traces of galena and sphalerite. Chalcocite is the dominant secondary sulfide and is the most important ore mineral. Native copper, cuprite and chalcotrichite along with chrysocolla comprise the bulk of the oxidized portions of the ore body.

Past production has come mainly from enriched zones in Pinal Schist. Ore grade is erratic and at present averages less than one percent copper. Protore in the leached schist capping averages between 0.1 and 0.2 percent copper. Because of this leached capping totalling approximately 500 feet the supergene ore body is believed to have originated from protore of the same grade.

Diabase intrusives in the Ray Mine form an important ore reserve as they were apparently the most important primary host rock in the area. The diabase exhibits little or no enrichment and copper values are thus derived from primary chalcopyrite. Diabase containing primary sulfides are often found above rocks which have been leached.

Alteration of the rocks in the Ray mine area is of three types as follows:

1. Biotite-orthoclase
2. quartz-sericite
3. propylitic - chlorite, epidote, clay minerals, etc.

Each of the alteration types is considered to be of hypogene nature.

Ore controls of the Ray mine are essentially structural with the primary controlling agents being the major faults and the zone of basement weakness along which the Granite Mountain Porphyry intruded.

GEOLOGY OF THE KELVIN PROSPECT

Surface geology of the Kelvin Prospect area is similar to the geology at Ray in some respects. The dominant host in the Kelvin Prospect is the Precambrian granite of the Tortilla Mountain batholith. The granite has been fractured, faulted and subsequently intruded by a wide variety of dikes, sills, and irregular bodies of rock ranging in composition from diabase to aplite. Repeated movement along fractures and faults has resulted in the broken nature of the rocks as is apparent on the geologic map. A discussion of the petrology of the various rock types and a review of their field relationships is presented to establish a basic geologic environment suitable for the emplacement of ore deposits.

Precambrian granite - (Grayback granite)

The granite of the Tortilla batholith crops out in over 60 percent of the mapped area. Typical hand specimens exhibit a medium grained texture ranging from light gray to pink in color. Common

minerals are phenocrysts of pink orthoclase feldspar, occasionally of a perthitic texture; quartz, both interstitial and as phenocrysts; and accessory amounts of magnetite, biotite, plagioclase, hornblende and apatite. The granite outcrops form rounded, highly weathered slopes except where silicification and sericitization has occurred. Alteration of the granite is intense over most of the mapped area and contact metamorphism is present to a lesser degree adjacent to intermediate dikes and irregular intrusives. The granite exhibits both propylitic and quartz-sericite stages of alteration and appears to have undergone an intense alteration along fractures where secondary orthoclase has been formed.

The granite host is highly fractured throughout the mapped area as evidenced by the geologic map. Many of these fractures are associated with the transecting dikes, but there are a number not associated with the exposed dikes. The geologic map shows the preponderance of fractures accompanied by disseminated sulfides along the fracture borders and also the presence of iron staining, goethite and limonite, and sulfide boxwork structures.

Mineralization in the granite is of two main types; primary sulfide minerals disseminated throughout the granite and more particularly associated with the feldspars and sulfide minerals along microfractures and quartz stringers. Mineralization is also present in the granite adjacent to many of the intermediate to basic dikes. Examination of available drill hole cuttings shows the persistence of low grade mineralization at depth in the granite, but also shows a marked leaching effect near the surface and a

partially leached zone down to approximately 1500 feet. Propylitic alteration is present at all depths thus far examined in drill hole cuttings.

Dacite porphyry - (Diorite porphyry)

The difference in terminology as applied to the porphyry dike systems is basically due to groundmass size rather than compositional differences. The dikes exhibit great textural changes from the central core to the outer fringes and representative samples are difficult to obtain. The dacite porphyry dikes intrude the Precambrian granite, diabase dikes and diabase porphyry dikes. Compositionally the dacite porphyry contains large 3 to 6mm phenocrysts of anhedral to subhedral quartz and occasional smaller phenocrysts of plagioclase and biotite in an aphanitic groundmass of gray to black augite, olivine and pyroxene with minor accessories of magnetite and apatite. At least two separate cycles of intrusion are represented by the diorite porphyry or dacite porphyry.

The majority of the dikes are more accurately described as quartz diorite porphyry or granodiorite porphyry depending upon varying amounts of potassium feldspar. These coarser grained dikes are younger than the dacite porphyry dikes.

Andesite - (Diabase)

Terminology is dependent upon grain size as in the dacite above with andesite pertaining to the finer grained variety. The diabase dikes are identical to the diabase of the Ray Mine area. Compositions vary considerably from the central portions of the dikes to their

borders. Typical diabase dikes show an aphanitic texture with occasional plagioclase phenocrysts.

Andesite Porphyry (Porphyritic Diabase)

The porphyritic diabase dikes crop out in scattered areas within the prospect and are not as numerous as the diabase above. The main difference is the tabular or rice grain shaped plagioclase phenocrysts. A few dikes contain dark pyroxene phenocrysts in an aphanitic groundmass.

Quartz Latite Porphyry (Quartz Monzonite Porphyry)

A quartz monzonite porphyry stock, intruded along a general east-west trend, is present in the southern part of the prospect. The monzonite is generally fresh with no significant alteration except along narrow east-west trending fractures where molybdenite and pyrite occur in small quantities.

The quartz monzonite or quartz latite depending on groundmass textures generally consists of anhedral quartz, orthoclase, plagioclase and biotite. A number of small metamorphosed biotite schist xenoliths and dacite porphyry xenoliths are present in the monzonite.

Aplite and Pegmatites

Aplite and pegmatite dikes are the youngest of the intrusives present in the prospect area. The aplite is a pink, fine grained rock consisting primarily of orthoclase feldspar, quartz and muscovite. Pegmatite veins consist of large massive quartz zones and large subhedral to euhedral crystals of orthoclase with minor

amounts of black tourmaline and occasional garnets. These dikes are generally fresh except near east-west or northwest-southeast trending fracture zones where pyrite, limonite and hematite fill fractures in the pegmatites.

Alteration

As discussed briefly in the section on rock descriptions two main types of alteration are prominent in the prospect area - propylitic and sericitization. A third type of alteration exemplified by the formation of secondary orthoclase is occasionally present along prominent fractures in the host granite and along margins of crosscutting dikes.

Propylitic alteration is the most extensive alteration type found in the prospect area as it occurs in virtually all rock types. Alteration products are typified by chlorite and epidote with minor amounts of albite, montmorillonite, limonite and sericite. Bleaching effects are also prominent.

Zones of quartz-sericite alteration are scattered throughout the area and are most prominent along east trending dikes and fracture systems. Several silicified zones occur in the granite along the east-west trends with no apparent relationship to the exposed dikes or other intrusive bodies.

Secondary alteration products such as limonite, goethite and jarosite are also present in scattered fracture systems and are pronounced in the vicinity of the Zelleweger claim.

Structure

Structure is the most important localizer of mineralization in the prospect area as well as in the Ray District. Prominent north-south, east-west, northwest-southeast and northeast-southwest faults marked by the dike systems intruded along zones of weakness and offsets of dikes show results of repeated movements through geologic time.

The north-south fracture pattern is the most obscure and oldest of the faulting in the area. Its existence is marked by diabase dikes striking north-south and apparent north-south offsets in the granite. Very little alteration or mineralization is present along this set of fractures. North-south diabase dikes are offset by east-west faults and the north-south movement occurred prior to quartz monzonite and quartz diorite intrusions.

Most of the diabase, quartz diorite and quartz monzonite dikes have been intruded along east-west fractures. Strike-slip movement is evident along a few vertical east-west faults. Many of the east-west striking dikes have been cut by northwest trending faults dipping steeply to the southwest (60° - 80°). The northwest dikes are extensively altered and contain significant mineralization. Heavy iron staining and copper oxide stringers crop out along these faults.

The intrusion of a large quartz latite (monzonite) porphyry stock in the southern part of sections 8 and 9 apparently occurred along a major weakness in the Precambrian structure. Mineralization associated with the later stages of intrusive activity appears to be closely

related to the quartz latite porphyry particularly along the outer margins although the major portion of the stock to the south and west of the prospect area is barren.

Minor east-west trending shear zones are developed in at least three places as indicated on the geologic map. The shear zones show evidence of repeated movements and contain significant amounts of molybdenum and copper mineralization. The shearing has altered a diabase or andesite dike into a chlorite-sericite schist and the host granite has undergone propylitic alteration and, to a minor degree, silicification. Disseminated molybdenite is present in the granite adjacent to the shear zones.

Mineralization

Mineralization in the Kelvin prospect is predominately copper-molybdenum with trace amounts of silver and gold.

As mentioned above the fracture systems and faults apparently control near surface mineralization. Most of the exposed dike systems carry copper oxides and contact zones show disseminated copper and molybdenum mineralization. The shear zones and adjacent wall rocks both carry copper and molybdenum mineralization.

Copper mineralization in the form of chrysocolla, azurite, malachite, chalcocite and melanconite occur in fractures in the granite and along the fringes of the quartz latite porphyry. Oxides also occur in the diorite porphyry dikes, diabase dikes and in silicified zones. Remnant sulfide zones containing chalcopyrite and pyrite have been found in scattered outcrops in the shear zones and along the north-west trending faults.

A drift 500 feet long has been cut along one of these northwest trending faults on the Zelleweger claim. The wall rock, Precambrian granite, has been sericitized and propylitized. Veinlets and stringers of chalcopyrite, bornite, chalcocite (after pyrite), sphalerite and specular hematite occupy fractures in the granite wall rocks. Some disseminated pyrite, chalcopyrite and minor amounts of bornite occur in the wall zones. Chalcanthite, leached from the granite is abundant along the entire length of the underground workings. Surface exposures of the northwest faults exhibit extensive chrysocolla veinlets and heavy iron staining. Numerous other shallow workings expose varying degrees of copper oxides.

Molybdenum mineralization is exposed in several shallow workings on the prospect and is most conspicuous on Rare Metals Claims 1 and 2 west of the southernmost minor shear zone and in Rare Metals 4. Ferrimolybdite and molybdenite are the most common molybdenum bearing minerals. A small quantity of powellite was also noted. The molybdenum minerals are found along fractures in the granite, along the northern fringe of the quartz monzonite porphyry intrusion, in the shear zones and in quartz veinlets. Both fracture fillings and disseminated mineralization are present.

Zinc mineralization has been noted in samples from the Johnson Prospect and in the Zelleweger tunnel. The ore mineral is the zinc sulfide, sphalerite.

Gangue constituents in the fault zones and quartz veinlets consist of minor amounts of calcite, barite and iron oxides. A quantity of specular hematite occurs along the minor shear zones in association with calcite and chlorite.

Previous Exploratory Programs

To fully understand the results of previous data derived from drill holes a review of drilling procedures and sample collecting techniques is necessary.

Minbanco Corporation initiated exploratory drilling on the prospect in late 1968. Drilling was accomplished using an air hammer technique and rock bit methods when encountering excessive water and samples were collected from the sample trench leading to the mud pits.

Due to extensive mixing of samples in both techniques a representative sample was difficult to obtain. Examination of many drill samples indicates considerable contamination occurred. Logs of the drill holes 1 through 4 and 6 through 9 are included in Appendix "A". Rock names were apparently derived from visual examination. As shown on the logs no distinction was made between quartz monzonite and granite and contacts can only be inferred between granite and monzonite in the available logs. Locations and depths of drill holes as shown on Minbanco's map were apparently designed through use of geologic and geophysical data. Inconsistencies between interpretation of the geophysical anomalies and the location of drill holes are apparent and are probably due to a lack of complete geophysical data. Sulfide mineralization encountered in drill holes J-1 and J-2 shows low grade copper and molybdenum. Accuracy of the samples is not known.

Tipperary Resources Corporation drilled two tests as located on the geologic and geophysical maps. Both tests were drilled on the basis

of surface geological features and proximity to shallow mineralization encountered in Minbanco's J-1 and J-2 drill holes. Both tests were designed to drill to a depth of 1500 feet.

A unique approach to hard rock drilling was utilized in the project to insure good sample recovery. A con-cor reverse circulation rig utilizing a double string of drill pipe and a revolutionary new sample catcher were used by the drilling contractor, Elenburg Exploration Inc. The sample collection system involved cycling all of the sample and drilling fluids through a rotating circular splitter which retains one-quarter of the sample and fluids. The portion retained was cycled through sizing screens and into a centrifuge which recovered all of the fine particles. Due to the tendency of molybdenum to escape by suspension in the drilling fluids a Baroid Molybdenum depressant was used to settle out and coagulate molybdenite particles.

No circulation problems were encountered and sample quality was considered excellent.

Results of drilling the initial two holes are inconclusive in establishing the presence of an ore body. This is due to (a) the submarginal grade of mineralization in both holes and (b) the hole location relative to anomalies shown by the 1-P surveys. Copies of both drill logs are in Appendix B with corresponding petrologic names and assays. Copper equivalents for the molybdenum mineralization are also presented and are calculated on a ratio of 5 to 1, or 0.1% Mo = 0.5% Cu.

Drill Hole No. 1

Located 125' FSL and 300' FEL of Section 8, drill hole No. 1 was spudded in alluvium and encountered Precambrian granite at 36 feet. The granite exhibited propylitic alteration and traces to 2% of sulfide mineralization. The quartz latite porphyry stock (quartz monzonite) was encountered at 225 feet and continued to 918 feet. Precambrian granite was encountered from 918 feet to 1400 feet. Two minor zones of metallization were encountered. The upper zone from 135' to 144' contained an average of 0.6% Cu and 0.05% Mo. This zone was encountered immediately above a narrow diabase (andesite) dike. The lower zone from 720' to 785' averaged approximately 0.2% Cu and 0.1% Mo. Several five foot zones show significantly higher grade mineralization as shown on the log in Appendix B.

It is significant to note that alteration of the granite and partial leaching of the pyrite and chalcopyrite disseminated throughout the granite occurs beneath the quartz latite stock.

The position of the drill hole is toward the southern edge of the geophysical anomaly and is not a true test of the anomalous conditions.

Drill Hole No. 2

Located approximately 1260' FSL and 150' FWL of Section 9, Drill Hole No. 2 was spudded in Quaternary alluvium and encountered Precambrian granite at 30 feet. The granite is highly altered and exhibits strong propylitic alteration. Bleaching and heavy iron staining are common. A number of narrow diabase dikes were

encountered in shallow drilling. Larger dikes of granodiorite and diorite porphyry were encountered at a depth of 650' to 765'. (See Appendix B)

Mineralization in Drill Hole No. 2 varies from background content to marginal grade. The granite is highly altered and partially leached to a depth of approximately 900 feet. The most common alteration products are limonite, goethite, hematite, epidote, chlorite, montmorillonite and secondary orthoclase. Ore minerals are chalcopyrite, pyrite, chalcocite, bornite and molybdenite. The mineralization is of the disseminated type although occasional fractures and veinlets are mineralized. It is significant to note that the leaching effect on the granite and associated ore minerals has produced some replacement of pyrite grains by chalcocite. It is also apparent that the copper content, although of a submarginal grade, has generally increased with depth. The possibility exists that effective leaching within the limits of the observed geophysical anomaly could produce an ore grade supergene enriched body at considerable depth. Additional drilling is needed to test this possibility.

Conclusions

It has been established by previous exploratory efforts that mineralization of a submarginal grade is present in the Kelvin Prospect. The program being followed by Tipperary was designed to evaluate the prospect for further development by a thorough geological examination and detailed geophysical investigations. Results of the geological and geophysical surveys are sufficiently encouraging to warrant an additional exploratory program as outlined by the geophysical report.

Available data indicates that the leaching of ore minerals in the granite host may have resulted in the creation of enriched zones at depth. An exploration program designed to comply with geophysical recommendations is needed to test this possibility. The relationship of the mineralization to the monzonite stock combined with the restriction of the geophysical anomaly to the area of the monzonite stock on the south and the diorite porphyry dike to the north provides an adequate ore-trapping structure which should be thoroughly evaluated by core drilling.

APPENDIX "A"

Johnson Claims
Pinal County
Arizona
SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 9-11-66
COMPLETED 9-16-66
DEPTH 530'
LOGGED BY T. L. Meeks
DRILLER Whatley Drilling Co.

HOLE NO J-1
PROPERTY A. M. Johnson
LOCATION SW¼ Sec. 9, T.5S., R.13E
COLLAR COORD. N. 9324 E. 9771
COLLAR ELEV. 2085
SHEET 1 OF 4
HOLE SIZE 5¼" Hammer Bit

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	Assays Au	Ag	Cu	Mo	Zn
10		Hole collared in Qtz. Monz. on contact with alluvial wash. Py, chpy, malachite and specularite in outcrop.	10	10	J-1	0	0	.01	.001	
20		Qtz. Monz.: Large orthoclase xls. Traces of malachite.								
30		Iron oxide with minor malachite.								
		Est. 5% specularite.	5	5	J-2			.03		
40		Est. 5% total sulfides.	5	5	J-3			.13		
		do.	5	5	J-4			.19		
50		do.	5	5	J-5			.61		
		Qtz. Monz.: Minor py & chpy, pronounced orthoclase xls & biotite.	10	10	J-10					
70		do.								
80		do.	10	10	J-6	0	[illegible]	.07		
90		do.								
100		do.								
110		do.								
115		Diabase dikes starting at about 118', Slightly pyritized, chpy traces. Monz. dikes 118-120'	10	10	J-7			.05		
130		Qtz. Monz.: Considerable pink orthoclase, some chpy, minor chlorite.								
140		do. Water at 140', slurry thereafter.	10	10	J-8			.04		
150		do. Diabase fragments, minor dikes.								
		do. 155-158' native cu fragments. M[illegible] fra[illegible]	10	10	J-9	0	.04	.13	.001	

Pyrite ([illegible]), chalcopyrite ([illegible]), [illegible]), chlorite (ch), crystals or crystalline (xl, xln) and mi[illegible]

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	ASSAYS Cu				
170		Qtz. Monz.: Few diabase fragments; minor py, chpy and specularite.								
180		do. Spec. of native cu, considerable ortho some sulfides.	10	10	J-10			.03		
190		Scattered cu oxides from surface to about 250'. Epidote increasing with depth.								
200		do.	10	10	J-11			.07		
210		do.								
220		do. Minor bornite. Increasing chloritization.								
230		do. Sericite	10	10	J-12	0	0	.06	.001	
240		do. Some bornite. Rock particles ½-1'' with strong py and chpy mtzn at 237'.	10	10	J-13			.07		
250		do. Py & chpy increasing below 230'.	10	10	J-14	0	0	.08		
260		Diabase and epidote. do.	10	10	J-15	0	.02	.08		
270		do. Sharp increase in mtzn at 268'; total sulfides est at 5%. Hard drilling.	10	10	J-16	0	0	.20		
280		do. Diabase fragments throughout.	10	10	J-17	0	.02	.32	.003	
290		do.	10	10	J-18	0	0	.53		
300		do.	10	10	J-19	0	0	.63	.01	
310		do.	8	8	J-20	0	.06	.45		
		do.	7	7	J-21	0	.03	.32	.007	
		do.	5	5	J-22	0	.03	.29		

J-1

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO.
PROPERTY
LOCATION
COLLAR COORD. N. ____ E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (m)	Au	Ag	Cu	Mo	Zn
		J-31 308-345'	37	37	J-31	0	.08	.20	.002	
		J-32 250-308'	58	58	J-32	0	.11	.69	.005	.03
		Spectrochemical composite J-17 to J-23 inc. (270-325', 55' total)								
320		Qtz. Mons.: Diabase fragments, some chlorite and ser.	5	5	J-23	0	.04	.20		
330		do. 231' dec. in mtan.	5	5	J-24	0	.03	.19	.001	
		do. Cu oxide 331-335', py & chpy.	5	5	J-25	0	.03	[illegible]		
340		do.	10	10	J-26		.07			
		do.	10	10	J-27		.15			
360		do.	10	10	J-28		.12			
370		do. Minor epidote & bornite.	10	10	J-29		.14			
380		do. Chpy & py increasing beg. at 383'.	10	10	J-30		.08			
390		Strong chloritization & some ser.	10	10	J-33		.12			
400		do.	10	10	J-34		.07			
410		do. malachite	5	5	J-35		.07			
		do. py, hematite, sert.	5	5	J-36		.11			
420		do. Hem and Magnetite	5	5	J-37		.10			
		do. Cu oxides	10	10	J-38		.08			
		do. Minor mtan, bornite & malachite; ser.	10	10	J-39		.14			
		do.	5	5	J-40		.09			

DIRECTION _____ HOLE NO J-1
INCLINATION _____ PROPERTY _____
STARTED _____ LOCATION _____
COMPLETED _____ COLLAR COORD. N. _____ E. _____
DEPTH _____ COLLAR ELEV. _____
LOGGED BY _____ SHEET 4 OF 4
DRILLER _____ HOLE SIZE _____

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu				
455		Qtz. Monz.: Considerable orthoclase & ch sericite, py & chpy, 3% magnetite & traces of oxides.								
465		do. Occasional pronounced veinlet of chpy.	10	10	J-42			.06		
475		do.								
485		do.								
495		do.	10	10	J-43			.06		
505		do.								
515		do.	10	10	J-44			.08		
525		do.								
530	TD	do.	5	5	J-45			.08		

Johnson Claims
Pinal County
Arizona
SCALE 1'' = 20'

DIRECTION Vertical
INCLINATION -
STARTED 11-15-68
COMPLETED 11-20-68
DEPTH 582'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-2
PROPERTY A. H. [illegible]
LOCATION SW Sec. 9, [illegible], 13[illegible]
COLLAR COORD. N 9454 E 10, 2[illegible]
COLLAR ELEV. 2133
SHEET 1 OF 4
HOLE SIZE 6 1/2'' Hammer Bit

Depth	Log	Rock Type and Description	Antenna (m)	Sample (m)	Sample No.	ASSAYS Cu
10		Hole collared in decomposed Qtz. Monz. 9 5/8'' hole to 17' & cased with 8 5/8'' surface pipe.				
20		Qtz. Monz.: Strong surface weathering to 23'; magnetite.	10	10	J-46	.07
30		do.				
40		do. Epidote, biotite and minor pyrite.				
50		do.				
60	.53	Base of surface weathering. Qtz. Monz.: Epidote, considerable biotite magnetite. Some py with traces of chpy.				
70		do. Granitic zone.	10	10	J-47	.02
80		do.				
90		Qtz. Monz.: Minor chlorite, epidote & sulfides. Water beginning just below 80'.				
100		do.				
110		do.				
120		do. Much biotite, partial alteration to chlorite, less than .5% sulfides.				
130		do.				
140		do. Traces of chpy & py.	10	10	J-48	.01
150		do.				
		do.				

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 2
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu
170		Qtz. monz.: biotite, magnetite & fragments of secondary orthoclase which usually has sulfides assoc. with it; less than 1% sulfides.				
180		do.				
190		do.				
200		Qtz and considerable biotite, moderate chlorite, only traces of chpy. Few large ortho. (large pink) xls that appear to be secondary orgin.				
210						
220		do.	10	10	J-19	.01
230		do. Py &chpy in veinlets associated with quartz & secondary orthoclase.				
240		do.				
250		do. Less than 1% sulfides, traces of chpy, sericite and chlorite.				
260		do.				
270		do.				
280		do. Decreasing biotite below about 260'.				
290		do.				
300		Increase py, est. 2%. Chpy usually found on darker pink orthoclase xls. Magnetite & chlorite.	10	10	J-50	.02
310		do.				
		do.				

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no)	ASSAYS Ag	Cu			
330		Qtz. Monz.: 1-2% py; shows of chpy. About 5% magnetite; chlorite.								
340		do. (Constant drilling rate from surface to 431', about 45' per hour.)								
350		do.								
360		Homogeneous unit from 320-400' with gradual sulfide increase from 350-420. Chpy showings.	10	10	J-51			.01		
370		do.								
380		do.								
390		do.	10	10	J-52			.02		
400		do. Total sulfides est. at 3%.								
410		do.	10	10	J-53			.01		
420		do.	10	10	J-54			.01		
430		Strong py mtsn; minor chpy. 429' sharp water increase.	10	10	J-55			.02		
440	432	Diabase: Greenish-gray, micro-crystalline, strong py mtsn with minor chpy.	10	10	J-56		0	.06		
450		Some qtz. Monz.; strong sulfides that are mostly py.	10	10	J-57			.06		
460		Qtz. Monz.: Dark pink orthoclase xls with sulfides mtsn (est. 4% total).	10	10	J-58		0	.02		
470	469	Less sulfides; traces of diabase and epidote.								
		Diabase: from about 469-478'; only traces of sulfides. Abundant epidote.	10	10	J-59			.01		

J-2

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Ag	Au			
490		Qtz. Monz.: Est. 1-2% sulfides, epidote, chlorite. Dark pink orthoclase xls.								
500		do.								
510		do.								
520		Chpy in veinlets and as coating on orthoclase & qtz. Sulfides est at 1%.	10	10	J-60		0	.03		
530		524-45' extremely soft drilling; some diabase.								
		do.								
550		do.								
		do.								
560		do.	10	10	J-61			.01		
570		do.	10	10	J-62			.02		
580										

Johnson Claims
Pinal county
Arizona
SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 11-21-58
COMPLETED 12-2-58
DEPTH 1165'
LOGGED BY T. L. Marks
DRILLER Whatley Drilling Co.

HOLE NO J-3
PROPERTY A. H. Johnson
LOCATION SE¼SE¼ Sec. 8, T3 R1
COLLAR COORD. N. 9,[illegible] E. 9,[illegible]
COLLAR ELEV. 2170
SHEET 1 OF 8
HOLE SIZE 6¾" Ham. Bit to 6[illegible]'
6¾" Rock Bit [illegible]-1165'

Depth	Log	Rock Type and Description	Recovery (%)	Sample (%)	Sample (No.)	ASSAYS Cu			
20		Hole collared in Quartz Monzonite with showings of pyrite, chalcopyrite & malachite. 9 5/8" hole to 10' and cased.	10	10	J-65			.05	
30	18	Qtz. Monz.: Sericite, considerable biotite and some chlorite. Minor sulfides. Diabase: Bgn. at about 18'. Dark greenish-gray, microcrystalline. Some py and chpy and traces of malachite.	10	10	J-66			.21	
40	36	do. Qtz. Monz.: Minor sericite and py. Pronounced orthoclase crystals which have the sulfides associated with them							
50		do.							
60	58	Diabase: Bgn. around 58'. Traces of py & chpy. First water coming in between 60-70'							
70		Diabase: Same as above.							
80		Diabase: Some Qtz. monz. with chpy & typical orthoclase crystals.							
90		do. No significant sulfides.							
100		do.							
110		Qtz. Monz.: Some diabase; traces of py & chpy.							
120		Diabase: Dark Greenish-gray, fine-grained. Carrying some sulfides. Scattered white quartz veins and crystals.							
130		do.							
140		do.	10	10	J-67			.02	
150		do.							

(py), Chalcopyrite (chpy), sericite (ser), chlorite (ch), crystals or
[illegible]alline (xl, xln), mineralization (min).

	DIRECTION	HOLE NO	J-3
	INCLINATION	PROPERTY	
	STARTED	LOCATION	
	COMPLETED	COLLAR COORD. N.	E.
SCALE	DEPTH	COLLAR ELEV.	
	LOGGED BY	SHEET 7 OF 8	
	DRILLER	HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Cu	Mo
	963	Qtz. Monz.; Some diabase. Twisted of at 540'.	3	3	J-11	.08	.033
970		Diabase: A little qtz. monz. with py, chpy and moly, sericitized.	10	10	J-11	.20	.10[illegible]
980		Qtz. Monz.: Diabase dikes. Est. sulfides .75%; py, chpy, mo. and occasional fragment of copper oxide.					
990		do.					
1000		Mtzn may be occurring on or near monz diabase contacts. do.					
1010		do. Increasing diabase.	10	10	J-11	.11	.00[illegible]
1020		Diabase & Qtz. Monz.: minor sulfides.					
1030		do.					
1040		do.	10	10	J-12	.06	.0025
1050		Qtz. Monz.: About 1/3 of particles are diabase. Fairly large fragments of py chpy. Partially chloritized, some ser.	10	10	J-12	.12	.012
1060		do. Sulfides and traces of copper oxides.					
1070		Minor diabase. Equal amounts of biotite and chlorite.					
1080		do. Partial kaolinization of feldspars.	10	10	J-12	.05	.00[illegible]
1090		do.					
1100		do.					
1110		do. Increased drilling rate between 1107 & 1129'; may be due to interbedded diabase and qtz. monz. and altered contacts.	10	10	J-12	.09	.007
		do.					

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 8 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No)	ASSAYS Cu	Mo
1130		Qtz. Monz.: Minor diabase. Pronounced pink ortho. xls with traces of py & chpy; about 3% magnetite.	10	10	J-12	.04	.003
1140		do. Flakes of oxide copper, may be coming from higher in hole.					
1150		do. Increasing diabase at 1150' to bottom of hole.	10	10	J-12	.06	.007
1160		do.	10	10	J-12	.05	.001
1170	1165 TD	do.					

James Sharpie School Lease
Pinal County
Arizona
SCALE 1'' - 20'

DIRECTION Vertical
INCLINATION -
STARTED 12-6-68
COMPLETED 12-9-68
DEPTH 126'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-4
PROPERTY Sharp-State Section
LOCATION NW¼ Sec. 16, 4S, 13E
COLLAR COORD. N. 7760 E. 9983
COLLAR ELEV. 2305
SHEET 3 OF 3
HOLE SIZE 6 1/2'' Hammer Bit

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Cu
10		Hole started in Qtz. Monz., 9 5/8'' hole to 20' and permanently cased.				
20		Qtz. Monz.: Surface weathering. Pronounced pink feldspars. Little or no ch, no sulfides				
30		do. ~~Base of intense surface weathering at~~ about 32'. Some ser, mostly biotite with limited ch; no sulfides detected.	10	10	J-127	.03
40						
50		Qtz. Monz. & Diabase: Diabase dike carrying cu oxides and sulfides	10	10	J-128	.07
		Qtz. Monz.: Slightly weathered, minor ch, traces of copper oxides.				
70		do.				
80		do. Considerable biotite & magnetite.				
90		do.				
100		do. Minor sulfides, Water starting near 90'.				
110		Qtz. Monz.: Prevailing lime-green coloration of feldspars.	10	10	J-129	.04
120		do. 107-117' Soft drilling (water course).				
130		Diabase & Qtz. Monz.: Minor sulfides mostly of pyrite.				
140		Diabase: Pyritized (Est. 1%), some chpy and a few Qtz. Monz. fragments.	10	10	J-130	.05
150		do.				
		do.				

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. J-4
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu				
170		Qtz. Monz.: Few pyritized diabase fragments.								
180		do.								
190		Diabase & Qtz. Monz.: Less than .5% sulfides with traces of chpy.	10	10	J-13			.05		
200		do.								
210		Decreasing diabase. do.								
		do.								
230		do.								
240		Qtz. Monz.: Est. 3-5% magnetite. Minor py & chpy. Increase water 221-240', Sludge samples starting at 230'.								
250		do. Considerable biotite.								
260		Slightly more sulfides, chlorite & sor Few scattered diabase fragments.								
270		do.	10	10	J-13			.03		
280		do.								
290		do.								
300		do. Possibly some sphalerite.								
310		do.								
		do. Homogeneous unit below 210'.								

J-4

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER
SCALE

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample No.	ASSAYS Au	Ag	Cu	Mo
330		Qtz. Monz. Biotite alteration except for some chlorite and sericite. Considerable biotite and magnetite. Py & chpy.							
340		do.	10	10	J-13			.02	
350		do.							
360		do.							
370		Qtz. Monz.: Pyritized diabase with traces of chpy.							
380		do.							
390		do.							
400		Qtz. Monz.: Pyritized diabase (Est. py 1-2%) Traces chpy. Large pink k-feld. xls.	10	10	J-[illegible]	0	.04	.02	.001
410		Minor diabase. Sulfides on or near diabase-monz. contacts. Moderately chloritized.							
420		do.	10	10	J-13			.02	
426 TD									

[illegible] Claims
Pinal County
Arizona
SCALE 1'' = 20'

DIRECTION Vertical
INCLINATION -
STARTED 12-13-63
COMPLETED 12-21-63
DEPTH 12[illegible]'
LOGGED BY T. L. Hanks
DRILLER Whaley Drilling Co.

HOLE NO. J-6
PROPERTY A. H. Johnson
LOCATION [illegible] Sec. 17, [illegible], 13[illegible]
COLLAR COORD. N. 7288 E. 8860
COLLAR ELEV. 2246'
SHEET 1 OF 8
HOLE SIZE 6[illegible]'' Hammer bit to 11[illegible]'
6[illegible]'' Rock [illegible] 11[illegible]-12[illegible]'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu				
10		Hole collared in qtz. monz. 9 5/8'' hole to 10' and cased with 8 5/8'' pipe.								
20		Qtz. Monz.: Considerable biotite, minor ch, a few specks of sulfides. Epidote, magnetite.	10	10	J-16[illegible]			.01		
30		do.								
40		do. Surfact water starting at about 30'. Epidote.								
50		do.								
		do.								
70		do. Diabase: Dark gray to black, micro-[illegible] & slightly [illegible]								
[illegible]		do.	10	10	J-17[illegible]			.0[illegible]		
[illegible]		do.								
[illegible]		do.								
[illegible]		do.								
[illegible]		do.								
[illegible]		do.								
[illegible]		Qtz. [illegible]: Pink orthoclase [illegible] with [illegible] sulfides; traces chay.	10	10	J-17[illegible]			.0[illegible]		
150		do. some diabase								
		Qtz. Monz.: Highly altered (ser), about 2% sulfides. Sand-sized part., moly.	10	10	J-17[illegible]			.01	.013	

J-5

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 8
HOLE SIZE

SCALE

Depth	Log	Rock Type and Description	Interval (Ft)	Recovery (Ft)	Sample (No)	Assays Au	Assays Cu	Assays Mo
170		Qtz. Monz.: Slightly pyritized & sh. Ser.; traces of chpy. & diabase.						
180		do.						
190		do.						
200		Diabase: Gray, heavily pyritized. Minor qtz. monz.	10	10	J-171		.01	
210		do. Decreasing sulfides.						
220		Qtz. Monz.: Small diabase dikes. Specks of epidote. Conversion to chlorite.						
230		Qtz. Monz.: Dark fine-grained biotite. Traces of py & chpy associated with quartz and or orthoclase mis. Appears to be more sericitic than holes No. 1-5.						
240		do.	10	10	J-172		.02	.002
250		do.						
260		do.						
270		do.						
280		do.						
290		do.	10	10	J-173		.02	
300		do.						
310		Slightly more chpy. do.	10	10	J-174		.02	.001
		do.						

J-6

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO.
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 8
HOLE SIZE

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (%)	ASSAYS Cu				
330		Qtz. Monz.: Sulfides, ch & considerable ser. Strongly seritized frag. are heavily pyritized.								
340		do.								
350		do. More epidote.								
360		do.	10	10	J-177			.01		
370		do.								
[illegible]		do. Decreasing biotite below 370'								
[illegible]		do.								
400		Qtz. Monz.: Less ch & ser. Sulfides in ortho. and qtz. xls.								
410		do. Epidote. Some feldspars altered to a light bluish-green.	10	10	J-178			.10		
420		do.								
430		Qtz. Monz.: Moderate ch & ser. Minor chpy and moly. 2nd ortho. darker pink and carries sulfides.	10	10	J-179			.05		
440		do. Epidote								
450		Qtz. Monz.: Same as above.								
460		do.								
470		do.								
		do.	10	10	J-180			.02		

	DIRECTION	HOLE NO	J-6
	INCLINATION	PROPERTY	
	STARTED	LOCATION	
	COMPLETED	COLLAR COORD. N.	Z.
SCALE	DEPTH	COLLAR ELEV.	
	LOGGED BY	SHEET 4 OF 6	
	DRILLER	HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no)	ASSAYS Cu				
490		Qtz. Monz.: Sulfides, epidote and minor ch. Total sulfides est at less than .5%.								
500		do.								
510	?	Diabase: Black, micro-xln, mtxn with py and chpy.	10	10	J-18[illegible]			.01		
520		do.	10	10	J-18[illegible]			.07		
530		do. Few fragments showing strong ser.								
5[illegible]		do.								
550	?	do. Qtz. Monz.: Light colored, few ortho. xln, some traces of sulfides. Epidote & gypsum flakes.								
560		do.								
570		do.								
580		do. Mors ser and gypsum. Inc. water 570'								
590		do. Inc. ser with larger cuttings showing considerable py in cubes form up to 1/8 in diameter.	10	10	J-18[illegible]			.01		
600		do.								
610		do.								
620		do. Strong ser., py plus 1%. Cemented at [illegible]								
630		do.	10	10	J-18[illegible]			.01		
		do.								

	DIRECTION	HOLE NO	J-6
	INCLINATION	PROPERTY	
	STARTED	LOCATION	
	COMPLETED	COLLAR COORD. N.	E.
SCALE	DEPTH	COLLAR ELEV.	
	LOGGED BY	SHEET 5 OF 8	
	DRILLER	HOLE SIZE	

Depth	Pyrite	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu	Mo
			Qtz. Monz: Moderate to strong ser. Less than .5% sulfides. Epidote.					
650	652							
			Diabase: Medium-xln, pyritized, some chpy.	10	10	J-187	.03	
660			do. Fragment of qtz. monz. Sulfides seem to decrease to 717'.	10	10	J-188	.03	
670			3-5% magnetite.					
680			do.					
			do.					
690			do.					
700			do.	10	10	J-189	.05	
710			do.	10	10	J-190	.04	.001
	717		Qtz. Monz.: Good sulfide mtn. Limited ch & ser. About 1% total sulfides. Semi-sized particles.					
720								
730			do.					
740			do.					
750			do. Varying amounts of ser & ch.					
760			do.					
770			do.	10	10	J-191	.06	
780			do.					
790			do.					
	798		Diabase:					

	DIRECTION		HOLE NO. J-6
	INCLINATION		PROPERTY
	STARTED		LOCATION
	COMPLETED		COLLAR COORD. N. ____ E.
	DEPTH		COLLAR ELEV.
	LOGGED BY		SHEET 6 OF 6
	DRILLER		HOLE SIZE

Depth	Log	Rock Type and Description				ASSAYS				
								Qt.	No.	Zn.
810		Diabase: Pyritized, moderate ser. Soft drilling 800-833'.								
[illegible]		do.	10	10	J-192			.01		
[illegible]		do								
[illegible]	833	do.								
[illegible]		Qtz. Menz.: Dark pink orthoclase xls. ~~Less than 1% py, some chpy and ser.~~								
[illegible]	[illegible]	do.								
[illegible]		Diabase: Some menz., micro-xln, dark gray to black. Heavily pyritized with shows of chpy. Moderate ser & ch.	10	10	J-193			.05		
[illegible]		Same as above except with more menz.	10	10	J-194			.02		
[illegible]		[illegible] Dark pink ortho. xls and qtz. xls with sulfides.	10	10	J-195			.02		
		do.								
		[illegible]	10	10	J-196			.02		
		[illegible] sulfides with showing of moly.	10	10	J-197	.02	0	.05	.01	.07
		do.	10	10	J-198			.05		.02
		do. Decreasing ser and sulfides.								
[illegible]		do.								
		do. Minor ser and sulfides. Fracse Epidote.								
		do. Sulfides associated with qtz.	10	10	J-199			.02		

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 7 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Assay (Au)	Assay (Ag)	Assay (Cu)	ASSAYS Cu	Mo			
970		Qtz. Monz.: Ser, Sulfides. Biotite appears to be partially converted to chlorite. Epidote xls.								
980		do.								
990		do. Partial alt of feldspars to clay. Chpy & moly in or on orthoclase or qtz. xls.	10	10	J-200			.01	.001	
1000		do.	10	10	J-201			.03	.010	
1010		960-1050' zones of strong sericite alteration, sulfides & showings of Epidote.								
1020		do.	10	10	J-202			.01	.002	
1030		do.								
1040		do.								
1050		do.								
1060		Qtz. Monz.: Fine particles, moderate ser, minor sulfides and epidote.								
1070		do.								
1080		Strong sericite. do.	10	10	J-203			.01		
1090		do.								
1100		do.	10	10	J-204			.01	.003	
1110		do.								
		Sand-sized fragments, less ser & sulfides.								

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample No.	ASSAYS Au	Ag	Cu	Mo	Zn
1120		Qtz. Monz.: Sand-sized fragments. Biotite, some ser & ch. Minor sulfides; magnetite								
1130		Slightly more ser & sulfides.	10	10	J-20[illegible]			.03		
1140		do. Moly coated & fracture-lined qtz.	10	10	J-20[illegible]	0	0	.02	.005	.01
1150		do.								
		Qtz. Monz.: Ser & some ch. Sulfides .5% or less. Particles of chpy & moly. Hole caving somewhere above.								
		do. Increase in water.								
	115	Converted to drilling with water and rock bit.								
		do. Strong ser & est. 1% sulfides, traces of moly.								
		do.								
		do. Chpy increasing 1192-1217'.	10	10	J-20[illegible]			[illegible]		
		Qtz. Monz.: Minor chlorite, calcite, [illegible] ser.								
		do.	10	10	J-20[illegible]			.01	.005	
		do.								

Johnson C[illegible]

Pinal County

Arizona

SCALE 1" = [illegible]

DIRECTION [illegible]

INCLINATION -

STARTED [illegible]

COMPLETED [illegible]

DEPTH [illegible]

LOGGED BY T. [illegible] Hanks

DRILLER Whatley Drilling Co.

HOLE NO. [illegible]-7

PROPERTY Johnson Claims

LOCATION [illegible] Sec. 5, [illegible]

COLLAR COORD. N [illegible] E. 8033

COLLAR ELEV. 2290

SHEET 1 OF 4

HOLE SIZE [illegible] Hammer bit [illegible]

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu	Mo
10		Hole collared in quartz monzonite porph. 95/8" rock bit to 14', cased with 14' 8 5/8" surface pipe.					
20	14	Qtz. Monz.: Weathered, light tan to br. 2-4% magnetite; pyrite fragments & py oxidization, moderate biotite.					
30		do.	10	10	J-209	.02	
40		do.					
50		Surface weathering extends to near 50'. do.					
60		do.					
70		do.					
80		do.					
90		do. Pyrite increasing.					
100		Some oxidization; silicification & chloritization. Qtz. carries about 1% pyrite, specs of chpy and moly.	10	10	J-210	.03	.001
110		do.					
120		do. Water beg. at 110' & inc. sharply @ 120'.					
130		do.					
140		do.					
150		do.					
		do.	10	10	J-211	.02	

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER
SCALE

HOLE NO J-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
BOLT SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS		Cu	Mo	
170		Qtz. Monz.: Dk gray, few dk pink ortho. xls, ch. Associated with ortho. is sem, chlorite & few epidote xls.	10	10	J-212			.03		
180		Seams & disseminations of py & chpy. Considerable magnetite.								
190		do.								
200		do.								
210		do. Bottom portion has plag. partially alt. to white clay.								
220		do.								
230		Qtz. Monz.: Prevaling tan with pink K-feld. & qtz. Traces of sulfides & epidote.								
240		do.								
250		do.								
260		do. Tan & gray, fine-grained chlorite; Traces of sulfides.								
270		do. Considerable water increase.								
280		do. Hammer bit buttons broke off at 273'								
290		do.								
300		do. Trace of mo.	10	10	J-213			.01	.002	
310		303' rods pulled-hole cemented, heavy water concentration (This sample contains about 75% cement).								
		Qtz. Monz.: Slightly chloritized, minor pyrite.								

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO J-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (No.)	ASSAYS Cu	ASSAYS Mo
330		20%. Monz.: Moderately chloritized, traces of py. Some of the ortho. xls have sulfides scattered through them or on cleavage faces. Total sulfides est. @ .5%. Fine-grained biotite which also has some sulfides assoc. with it. Epidote.					
340							
350		do.					
360		do.	10	10	J-211	.01	
370		do.					
380		do.					
390		do.					
400		do.					
410		do.					
420		do. Partial kaolinization of plag. Only few sulfides.	10	10	J-212	.01	
430		do.					
440		do.					
450		Slight increase in pyrite. do.					
460		do.					
470		do.					
480		do.					

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Assay (%)	Sample No.	ASSAYS Cu	ASSAYS Mo
490		478-495' Qtz. Monz. & Diabase: Sulfides est. at 1%, large ortho xls.	10	10	J-216	.01	
500	495	Qtz. Monz.: White to light-gray, biotite? sulfides less than .5%. Extremely hard from 495 to 531'. (Aplite dikes)					
510		do.					
520		do.					
530		do. Caving from about 250'					
540		Qtz. Monz.: Small diabase dike. Traces of sulfides.					
550		Qtz. Monz.: Hard, few sulfides, higher qtz. content.					
560		do.					
570		do.					
580		do.	10	10	J-217	.01	.001
	531 TD	Note: Below 495' hole was cemented three times ing an attempt to shut off the large water volume (est. 100-200 gpm). Rock composed partially of aplite dike material which is unusually hard; nine rock bits used in this interval.					

Johnson Property
Pinal County
Arizona
SCALE 1'' = 20'

DIRECTION Vertical
INCLINATION -
STARTED 1-2[illegible]-69
COMPLETED 2-1-69
DEPTH 972'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-8
PROPERTY Johnson Claims
LOCATION SW¼SW¼ Sec. 9, 4S, 13E
COLLAR COORD. N 8270 E 10,105
COLLAR ELEV. 2295
SHEET 1 OF 6
HOLE SIZE 6[illegible]' Ham. Bit to 762'
Rock Bits to 972'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu
10		Hole collared in weathered QTz. Monz. 9 5/8'' rock bit to 20' & cased. ~~Small c-w mtzn streaks NE of collar.~~				
20		Weathered Qtz. Monz.: Considerable magnetite and iron oxides.				
30		do. sericite	10	10	J-21[illegible]	.01
40		Qtz. Monz.: Large fragments showing moderate ser & considerable qtz. ~~Very few sulfides.~~				
50		do. Partial alt. of biotite.				
60		do.				
70		Slight oxidization, first sig. pyrite minor sericite.				
80		Minor ser., est .5-1% total sulfides. First water.				
90		Diabase coming in at about 85'. Py, chpy and some bornite.	10	10	J-219	.02
100		Diabase & Qtz. Monz.: Diabase dike 85-93', sulfides within dike and on contact. ~~Minor sericite.~~				
110		Chpy on dk pink ortho xls.				
120		do.				
130		do.				
140		do. Inc. pink feld. Py veins.				
150		do.				
		do. Iron oxide frag. to 160'				

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
BRAZER

HOLE NO J-8
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Dip	ASSAYS Au	Ag	Cu	Mo	Zn
170'		Qtz. Monz.: Increasing pyrite with xls to 1/8" dia. Some chpy and ser.	10	10	-2[illegible]			<.01	<.001	.01
180		About .178' sulfides of py, chpy and sphalerite (1-2%). Minor 2-nd ortho.	10	10	[illegible]	0	0	.01	<.001	.40
		do. Heavy oxides 183-85.	5	5	[illegible]	[illegible]	.03	.01	<.001	.31
190		do. Decreasing sulfides	5	5	[illegible]			<.01	<.001	.06
		Qtz. Monz.: About 20% limonite, some ser and minor sulfides.								
200		do. Iron oxidized water 198-203'								
210		Plag a light bluish-green. Py less than 1%. Diabase dike at 214'. Considerable sericite.								
220		Traces of chpy. Oxidized frag. do.	10	10	-22[illegible]			<.01		
230		do.								
		do.								
240		do.								
250		do.	10	10	-225			<.01		
260		do. Chpy								
270		do. Iron oxide, sulfides and sericite.								
280		do.								
290		do.								
300		do.								

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO J-8
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 6
HOLE SIZE

Depth	Lithology	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample No.	ASSAYS Cu				
330			Qtz. Monz.: Minor iron oxides & sulfides (py & chpy), sericite. Magnetite.								
340			do.								
350			do. Biotized granite; much like thin zones ~~near diabase dike contacts as seen at~~ surface. (Water fairly cont. at about 10 gpm)								
360											
370			do.								
380			do.								
390			Plag. are light-bluish-green as drilled through higher up. Traces of py with ~~flakes of chpy, some sericite.~~								
400			do.								
410			do.								
420			do.	10	10	1-22			.03		
430			Some dk pink ortho with sulfides. Traces of ser & iron oxides persisting to 440'								
440			do.								
450			do.								
460			Slightly pyritized with traces of chpy, ser and ch. Iron oxides; flakey ser. ~~Sericite.~~								
470			do.								
			do. Hematite; slightly more sulfides.								

J-8

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS				
								Cu	Mo	Zn
[illegible]		Qtz. Monz.: Partial alteration of biotite to ch. Traces of sulfides & ser, epidote, Chpy & Mo assoc. with some of the quartz fragments.								
500		do.								
510		do. Chpy on orthoclase.	10	10	J-22[illegible]			.02	.001	.0[illegible]
520		do.								
530		Partial chloritization. Chpy veinlets in dk pink ortho. Micaceous iron oxides.								
540		do.								
550		do.								
560		Minor sulfides and traces of micaceous iron oxides.								
570		do. Few pink feldspars; generally white & gray with chpy and bornite showings.								
[illegible]		Slight increase in overal sulfides. Ch and ser showings.	10	10	J-22[illegible]			.04		
[illegible]		do.	(Composite of No. 22[illegible] & 2[illegible] [illegible]) (" " 2[illegible] & [illegible] [illegible])							
[illegible]		do.								
[illegible]		do. Chpy traces.								
[illegible]		do. Pyrite mainly in biotised zones around feldspar crystals.								
[illegible]		do.								
[illegible]		do.	10	10	J-[illegible]			.03		

DIRECTION		HOLE NO	J-8
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N.	
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET 5 OF 6	
DRILLER		HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Au	Ag	Cu	Mo	Zn
50		Qtz. Monz.: Minor sulfides, slightly ser. Chpy as veinlets on or within dk pink ortho. Micaceous iron oxides.								
60		Sulfides begin increasing about 580' were there are approx. .5% to this interval where there is slightly								
70		over 1%. Traces of chpy and mic. iron oxides, some hematite.								
80		do.								
90		do.	10	10	J-230			.04		
00		do. Inc. in water.								
10		do.	10	10	J-231			.03		
20		do.								
30		do.	10	10	J-232			.02		
40		Sulfides 1-3%; hole caving at about 660' and 160-220' (Iron oxides)								
			4	4	J-233			.03	.001	
		Extremely fine sulfides, some chpy, and mic. iron oxides and sphalerite. Minor diabase.	10	10	J-234	0	0	.06	.001	.1[illegible]
		do.	10	10	J-235			.07	.001	.5[illegible]
		do.	10	10	J-236			.06	.001	
		do. 1-2% sulfides.								
		do. 1% sulfides.								
		do.	10	10	J-237			.03		

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-8
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	ASSAYS Cu				
810		Qtz. Mons.: Extremely fine particles; some ortho (secondary) & mo traces.								
820		Thin diabase dike. Qtz, sulfides, ch and some moly. (Rock bit with drilling mud starting at 812')								
830		do. Part. alt of biotite	10	10	J-238			.04		
840		do. Increase in ser and ortho, less diabase								
850		do.								
860		Minor sulfides and diabase and kaolinization. Total sulfides est at less than 1%.								
870		do.								
880		do.								
890		About 3% of the fragments are made up of diabase, some chlorite.								
900		do.								
910		Minor diabase, ser and ch. Some clay alt.								
920		Sulfides and secondary ortho. Inc. calcite content.								
930		do.								
940		do.	10	10	J-239			.04		
950		do.								
960		do.								
972 T.D.		do.								

Johnson Property
Pinal County
Arizona
SCALE 1" = 20' or as shown

DIRECTION Vertical
INCLINATION -
STARTED 2-3-69
COMPLETED 2-27-69
DEPTH 2320'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-9
PROPERTY Johnson Claims
LOCATION NE¼NE¼ Sec. 17, 4S, 13E.
COLLAR COORD. N. 7790 E. 9160
COLLAR ELEV. 2210
SHEET 1 OF 10
HOLE SIZE 6" Ham. Bit to 538'
Rock Bits below.

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample No.	Assays Cu	Assays Mo
10		Hole collared in wash near contact with Qtz. Monz. Porph. 9 5/8" rock bit to 41' and cased with 8 5/8" surface pipe.					
20		Alluvial Wash: Sulfides in outcrop near collar.					
30		do.					
40	38	do. Bedrock at about 38'					
50	41	Qtz. Monz.: Predominantly a light-gray, few pronounced ortho fragments. Minor sulfides. Shows of copper oxides.					
60		Little alteration. Traces of sulfides, fine-grained biotite, partial alt. to ch.	10	10	J-2[illegible]	.01	
70		do.					
80		Part. alt feld; moderate chlorite. Rust stained joints and fractures. Traces of sulfides & ser. inc. with depth. Epidote traces.					
90		do.					
100		do.					
110		do.					
120		do.					
130	129	Moderate ch & ser, some secondary ortho. Inc. chpy and mo beg. at 129'.	10	10	J-24[illegible]	.01	.001
140		do.	10	10	J-24[illegible]	.03	
150	145	do.					
		Diabase: Dk gray to black; py, chpy and some epidote.	10	10	J-24[illegible]	.02	
	15	do.	5	5	J-24[illegible]	.02	
		Minor qtz. mon., Pyritized					

J-9

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO.
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu	No
		Diabase: Pyritized, some Qtz. Monz.					
170	168						
		Qtz. Monz. & Diabase: Thin dikes of diabase which are pyritized and carry some chpy. Moderate ch and fine biotite.	5	5	J-245	.01	
180		do.					
190							
200		do.	5	5	J-246	.01	
		Qtz. Monz.: Moderate ch & ser, fine-grained biotite; traces of chpy.					
210		do.					
220		do.					
230		do.	5	5	J-247	.01	
240	244	Diabase: Py and chpy, est total 1%.	5	5	J-248	.01	
250			5	5	J-249	.04	.001
		do.					
260	257	Qtz. Monz. and Diabase: Diabase dikes 257 to 273'. Sulfide traces.					
270		do.					
	273	Qtz. Monz.: Minor ser, chpy and py. Sulfides associated with the qtz.					
280		do.					
290		do.					
300		do.					
310		Minor diabase. Alluvium washing into hole beneath surface casing.					

DIRECTION _____ HOLE NO J-9
INCLINATION _____ PROPERTY _____
STARTED _____ LOCATION _____
COMPLETED _____ COLLAR COORD. N. _____ E. _____
DEPTH _____ COLLAR ELEV. _____
LOGGED BY _____ SHEET 3 OF 10
DRILLER _____ HOLE SIZE _____

Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu				
	Qtz. Monz.: with small dikes of pyritized diabase. Some ser and minor ch; sulfides assoc with qtz. or secondary ortho.								
	do.								
	do								
		5	5	J-250			.04		
	Diabase dikes from a few inched thick to 5-10'; mts thorough with slightly more sulfides near the contacts.								
	do.								
	do.								
	do.								
	do.								
	do.								
	Some sample pollution from beneath casing. Hole cemented back to the surface from 416'. Total sulfides in diabase 1-3%; less than one percent in Qtz. monz.	5	5	J-251			.01		
	Diabase and Qtz. Monz.: Sulfides in dia. Ch and very few ortho frag.; gypsum & some calcite.	10	10	J-252			.03		
	do.								
	do.	10	10	J-253			.05		
	do.								
465	Diabase & Qtz. Monz.: pyritized, shay in dark pink ortho and qtz. Traces of epidote.								
	do.								

J-9

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
SCALE

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description				ASSAYS
490		Qtz. Mons.: Few frag of diabase. Sulfides less than .5%. Traces of chpy on Dark pink ortho crystals.				
500		do.				
510		do.				
520		Moderate ch; traces of chpy & py, some ser. Pronounced dark pink ortho xls.	10	10	1-25	401
530		do.				
540		do. (Hammer bit not properly working due to large volume of water. Hole drilled below 538' with rock bits.)				
550		do.				
560		do.				
570		Beginning about 570' rock becomes a darker greenish-gray with more chl/sericite.				
580		do.				
590		do. Slightly more chpy	10	10	1-25	[illegible]
600		Qtz. Mons.: Same as above except with a few frag of py & chpy bearing diabase.				
610		do.				
620		do.				
630		do.				

J-9

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO.
PROPERTY
LOCATION
COLLAR COORD. N. ____ E. ____
COLLAR ELEV.
SHEET 5 OF 10
HOLE SIZE

SCALE 1" = 40'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu
650		Qtz. Monz.: Few scattered frag. of py & chpy bearing diabase. Minor chlorite and small about of clay alteration in the plagioclase. Some scattered and very minor particles of epidote. Homogeneous unit from about 610 to 800 feet.				
660						
670						
680						
690						
700						
710						
720						
730						
740						
750			10	10	J-256	.01
760						
770						
780						
790						
800						
810		Qtz. Monz.: Some diabase; Est. 1% sulfides Minor ch & ser; decrease in secondary orthoclase.				
820			10	10	J-257	.01
830						
840						
850		Qtz. Monz.: Gradual increase in ch & sulfides. Prevailing greenish-gray. Minute flases of py & chpy in ortho particles. Continued minor showings of clay alteration. Sulfides est at slightly more than 1%.	10	10	J-258	.01
860						
870						
880						
890						
900						
910		Less chlorite; same as above				
920			10	10	J-259	.04
930		Diabase and minor Qtz. Monz.: Moderately pyritized with showings of chpy; ch. Total sulfides around 1%. Epidote fragments.				
940						
950						

DIRECTION		HOLE NO.	J-9
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N.	E.
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET 6 OF 10	
DRILLER		HOLE SIZE	

SCALE 1" = 40'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (m)	ASSAYS Cu
970		Qtz. Monz.: Light greenish- gray, slightly sericitized with an estimated .5% sulfides. Moderate ch and clay alteration. Epidote fragments.				
980						
990						
1000						
1010						
1020		Pale green coloration of plagioclase and some orthoclase 962-1070'; few pyrite and chalcopyrite bearing diabase fragments.	10	10	J-26[illegible]	.01
1030						
1040						
1050						
1060		Do.				
1070						
1080		Pronounced dark pink orthoclase with moderate clay alteration.				
1090						
1100						
1110		Homogeneous unit 1070 to 1240'; diabase increases in last 30-40'.	10	10	J-26[illegible]	.01
1120						
1130						
1140						
1150						
1160						
1170						
1180						
1190						
1200						
1210						
1220						
1230						
1240		Diabase & Qtz. Monz.: Pyritized; slight overall sulfide increase. (Five foot samples 1250-1290').				
1250						
1260			5	5	J-26[illegible]	[illegible]
1270		Diabase, qtz. monz. same as above.				

SCALE 1" = 40'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
SAMPLER

HOLE NO. J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 7 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description				ASSAYS
1290	✓	Qtz. Monz.: Moderate chlorite and clay alteration only traces of sulfides. Some cpy and pyrite found either on or within the dark pink orthoclase crystals or the quartz. Scattered fragments of epidote.				
1300	✓					
1310	✓					
1320	✓					
1330	✓					
1340	✓					
1350	✓					
1360	✓					
1370	✓					
1380	✓					
1390	✓	Gradual increase below this depth in the quantity of clay content.				
1400	✓					
1410	✓	Homogeneous unit with little variation except for some small [illegible] and varying clay alteration.				
1420	✓					
1430	✓					
1440	✓					
[illegible]	✓	Inc. [illegible], flakes of [illegible] quartz.	10	10	[illegible]	[illegible]
[illegible]	✓	[illegible] as above.				

SCALE 1" = 40'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 8 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Specific (lb)	ASSAYS
1610		Qtz. Monz.: Moderate chlorite and clay alteration. Minor diabase which has pyrite and traces of chalcopyrite disseminated through it and concentrated along the fractures. Cpy is more common on the orthoclase crystal faces. No moly shows detected below 630 feet. Clay alteration consists of from 5 to 20% of the total samples.				
1620						
1630						
1640						
1650						
1660						
1670						
1680						
1690						
1700						
1710						
1720						
1730						
1740						
1750						
1760		Increase in diabase.				
1770		Qtz. Monz.: About 10% of the particles made up of diabase. Clay alt. to near 1800'.				
1780						
1790						
1800						
1810		Qtz. Monz.: Little clay alt. Sulfides increasing slightly above previous 30-foot interval. 1820' Return of clay alteration. Cpy seen on dark pink orthoclase particles.				
1820						
1830						
1840						
1850						
1860						
1870						
1880		Sharp increase in fine-grained, black biotite.				
1890						
1900		Diabase: Pyritized with some cpy. Rare qtz. Monz. fragments.	10	10	4-265	.03
1910		Qtz. Monz.: Same as above.				

SCALE 1" = 10'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. J-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 9 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	ASSAYS Cu	ASSAYS Mo
1930		Qtz. Monz.: Few pyritized diabase particles. Moderate chlorite & sericite. Total sulfides are approximately .5% with traces of chalcopyrite. 3-5% magnetite. Clay alteration is about 15% of the returns. Nearly 1/3 of the cuttings are made up mostly of mafic minerals; this decreases below 1980'		10	J-260	.03	.001
1940							
1950							
1960							
1970							
1980							
1990							
2000							
2010							
2020							
2030		More mafic material.					
2040							
2050		Qtz. Monz. & Diabase: Diabase is pyritized and includes showings of chpy; biotite					
2060			10	10	J-261	.004	
2070							
2080							
2090			10	10	J-262	.004	
2100		Qtz. Monz.: Minor chlorite and sericite. Clay alteration, minor sulfides.					
2110							
2120							
2130							
2140							
2150							
2160		Chpy on dark pink (secondary) orthoclase crystals.					
2170							
2180							
2190			10	10	J-263	.004	
2200							
2210							
2220							
2230							

SCALE 1" = 50'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 10 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Dip (°)	ASSAYS Cu
2250		Qtz. Monz.: Moderate chlorite, some ser. Only minor sulfides. Limited clay alteration. Some pyritiezed diabase.	10	10	J-270	.01
2260						
2270						
2280						
2290						
2300		Qtz. Monz.: Considerable diabase which is carrying considerable py and traces of chpy.				
2310						
2320 T.D.			10	10	J-270	.05

	DIRECTION	HOLE NO	J-3
	INCLINATION	PROPERTY	
	STARTED	LOCATION	
	COMPLETED	COLLAR COORD. N.	E.
SCALE	DEPTH	COLLAR ELEV.	
	LOGGED BY	SHEET 2 OF 8	
	DRILLER	HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Cu				
170		Diabase: Dark greenish-gray, mirocrystal line, pyritized and chloritized, magnetite & white quartz. Sulfides	10	10	J-63			.08		
180		(est. 1-2%) appears to be fairly well disseminated with concentrations along veinlets.								
190		do.								
200		do. Less pyrite and strong chloritization.								
210		do.								
		do. Py est. at near 1% & 3% magnetite.	10	10	J-64			.18		
230		Less than a percent pyrite.								
240		do.								
250		do.								
	252	Qtz. Monz.: Minor sulfides.								
270		do. Between about 260-285' the rock is more granite than a monzonite.								
280		do.								
290	285	Diabase: Same as upper units. No important sulfides.								
300		do.								
310		Qtz. Monz.: Traces of py and chpy. Typical orthoclase xls. Biotite and an estimated 3% magnetite. Moderate chloritization. Minor sericite.	10	10	J-68			.03		

	DIRECTION	HOLE NO	J-3
	INCLINATION	PROPERTY	
	STARTED	LOCATION	
	COMPLETED	COLLAR COORD. N	E
SCALE	DEPTH	COLLAR ELEV.	
	LOGGED BY	SHEET 3 OF 8	
	DRILLER	HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu
330		Qtz. Monz.: Typical pronounced orthoclase xls. Considerable biotite & 2-3% magnetite. Traces of py & chpy.				
340	339	do. Water at 336'.? Drilling rate to 339' about 75'/ hour. Slower penetration below this depth.				
350		Qtz. Monz.: Few scattered fragments of diabase. Sulfides less than 1% with about half composed of chpy. Chpy is associated with quartz or orthoclase crystals.				
360		do.				
370		do.				
380		do.				
390		do.	10	10	J-69	.05
400		do.				
410		do.				
420		Granite & Qtz. Monz.: Sharp decrease in orthoclase. Much biotite. Fragments of py and chpy.				
430		do.				
440		Qtz. Monz.: Same as above without the diabase.				
450		do. Minor diabase.				
460		Qtz. Monz.: About an equal amount of diabase. Traces of sulfides.				
470		do. Some of diabase fragments have disseminated through them finely xln py and chpy.				

J-3

DIRECTION _____ HOLE NO _____
INCLINATION _____ PROPERTY _____
STARTED _____ LOCATION _____
COMPLETED _____ COLLAR COORD. N. _____ E. _____
DEPTH _____ COLLAR ELEV. _____
LOGGED BY _____ SHEET 4 OF 6
DRILLER _____ HOLE SIZE _____

Log	Rock Type and Description	Interval (ft)	Sample (ft)	Sample No.	ASSAYS Au	Ag	Cu	Mo	Pb	Zn
	Qtz. Mons.: Minor quantity of diabase									
	do. Scattered fragments of chpy and mo.									
	do. Vein type coatings of chpy with mo lining outside (earlier mineralization)	10	10	J-70			.09	.008		
	Chpy & mo., traces pyrite. Total sulfides est. @ less than 1% but incr. with depth. Starting @ 400-500'.	10	10	J-71	0	0	.09	.009		
	Heavy ch & mo. Chpy & mo present in strong sulfide mtzn. Sphalerite having slightly green cast.	10	10	J-72			.12	.03		[illegible]
	do.	10	10	J-73	0	0	.13	.031		.39
	do. Easy drilling through ore zone, exceptionally soft at about 565'	10	10	J-74			.21	.056		2.12
	Ore washed out in cleaning hole from 520-590'; sample no. J-88 also complete spectrochemical analysis.	10	10	J-80 J-75	0	0	[illegible] .15	.10 .106	.01	7.5 1.88
	567-569 No. J-77	10	10	J-77 J-76	.005	.3	[illegible] .45	.12 .095		4.39 2.15
	Strong sericite below about 570'	10	10	J-78			.05	.095		1.1
	Decreasing mtzn bag. about 575'. Strong chloritization, some fine hematite.	10	10	J-79	.005	.19	.72	[illegible]		1.74
	Est. sulfides 1%, chpy to moly about 1:1	10	10	J-80			.15	.016		.62
	Considerable biotite, minor mtzn. More granitic than qtz. mons.	10	10	J-81	0	0	.06	.015		.14
	do.	10	10	J-18			.17			
	Qtz. Mons.: Some sulfides of chpy, py and mo. Sericitic.	10	10	J-18			.06	.011		.40
	Increasing sericite and hematite.	10	10	J-82			.04	.005		

J-85 Drillers sample from sump before converting to [illegible] 2.88
J-86 Hands Sample " " .005 .13 [illegible] 2.32
J-87 " From drain ditch to sump. 0 .11 [illegible] 2.24

SCALE

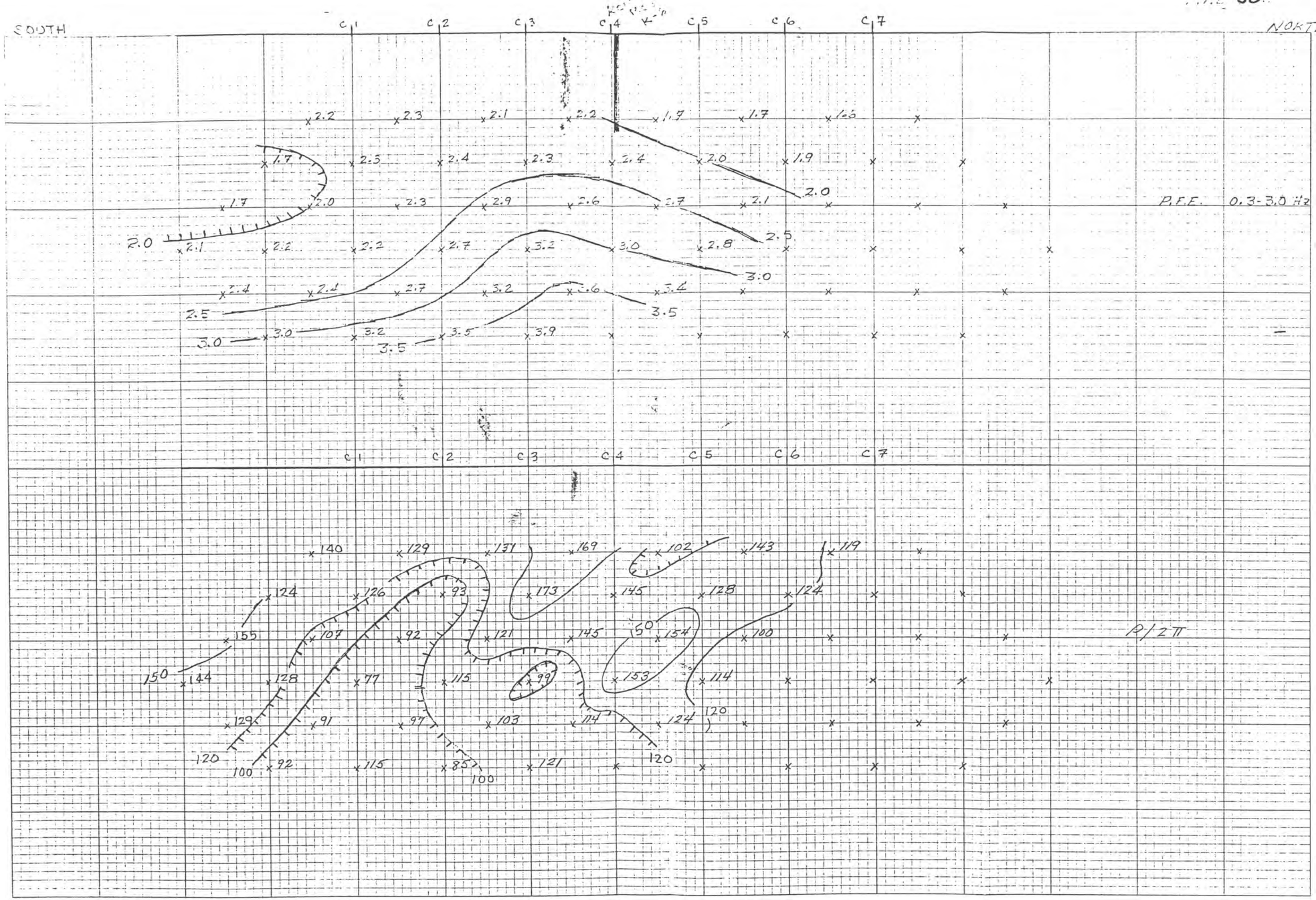
DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (No.)	ASSAYS Au	Ag	Cu	Mo	Zn
		Same as above.	10	10	J-96	0	0	.10	.105	
810		Qtz. Monz.: Diabase dikes. Est. sulfides less than 1% mostly as chpy, minor py & mo. Chlorite and ser. Mtzn appears to	10	10	J-95	0	.07	.25	.052	
820		be associated with diabase. Small specks of copper oxide. Hematite and decreasing chlorite.	10	10	J-97			.20	.028	
830		do. Mtzn does not appear to increase with diabase content.	10	10	J-105			.19	.025	.21
840	842	Decreasing Mtzn. Pred. biotite over chlorite.	10	10	J-106	0	0	.12	.038	.13
850		do.								
860		do. Total sulfides est. @ .8%	10	10	J-107			.10	.015	.17
870		Qtz. Monz.: Some diabase. Biotite & ch, Sulfides less than 1%. Specks of oxide.	10	10	J-108			.12	.015	.16
880		Homogeneous unit from 870-960', except for increasing diabase at about 938'.	10	10	J-109			.10	.015	.11
890		do.	10	10	J-110			.11	.011	
900		do.	10	10	J-111	0	0	.09	.018	
910		do.	10	10	J-112			.10	.015	
920		do.	10	10	J-113			.08	.011	
930		do.	10	10	J-114			.08	.017	
940		do.	10	10	J-115			.09	.027	
950		do. Silightly more sulfides; inc. diabase.	10	10	J-116	0	0	.10	.013	.49

DIRECTION _____ HOLE NO J-8
INCLINATION _____ PROPERTY _____
STARTED _____ LOCATION _____
COMPLETED _____ COLLAR COORD. N. _____ E. _____
DEPTH _____ COLLAR ELEV. _____
LOGGED BY _____ SHEET 5 OF 8
DRILLER _____ HOLE SIZE _____

Depth	Log		Rock Type and Description	Length (Ft)	Length (Ft)	Sample No.	Au	Ag	Cu	Pb	Zn
			Qtz. Mons.: Some granitic material. Good mtzn beg. at 641'. Sulfides Semi-altered.	2 8	2 8	J-84 J-85	0	.13	.19 .71	.07	[illegible]
			J-83 from around collar at beg. of shift			J-83			.61	.09	[illegible]
			Qtz. Mons.: With granitic and diabase material. Moderate chlorite.	10	10	J-90	0	.04	.16	.06	3.5
			Qtz. Mons.: Mtzn. Rst. total sulfides at over 2%. Hematite. Sand-sized particles	10	10	J-91	0	0	.22	.05	[illegible]
			do.	10	10	J-92	0	.15	.37	.23	1.5
			do. Thin diabase dikes.	10	10	J-93	0	0	.19	.07	.7
			do.	10	10	J-94	0	0	.15	.09	1.0
			do. Total sulfides 15 or less. Dropped some. Sulfides partially leached.	10	10	J-95			.07	.022	
			do. Minor gn oxides & poly.	10	10	J-97			.04	.012	
			Total sulfides less than .5%; hematite sulfides diabase.	10	10	J-98			[illegible]	.011	
			do.								
			do.	10	10	J-100			[illegible]	[illegible]	
			do.								
			do.	10	10	J-102	0	0	.02	.012	
			do. Increasing diabase and sulfides.								
			do.	10	10	J-103			.06	.015	
			Increasing sulfides and gn oxides below 750' & between 800-820'.	10	10	J-104	0	0	.21	.011	.6



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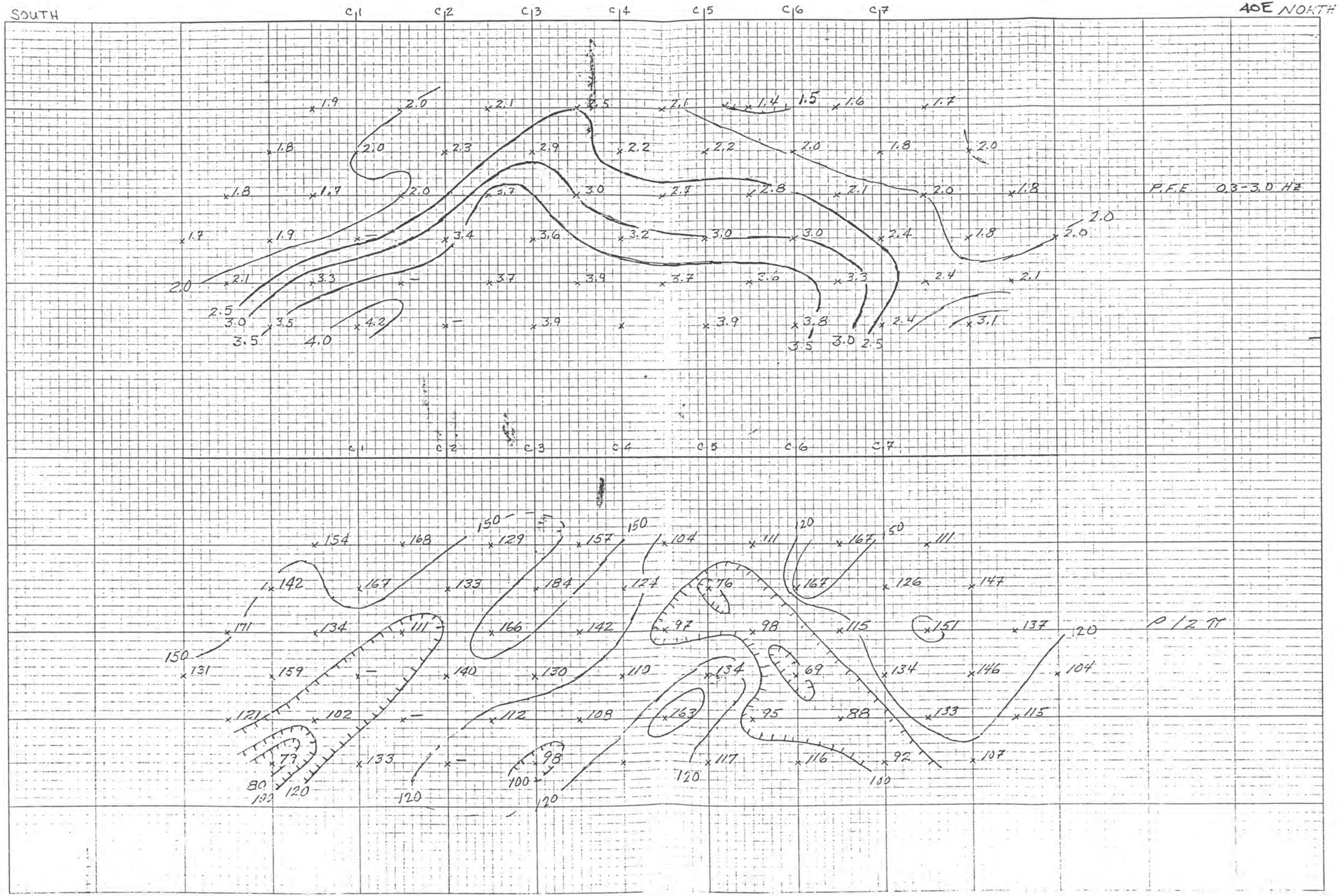

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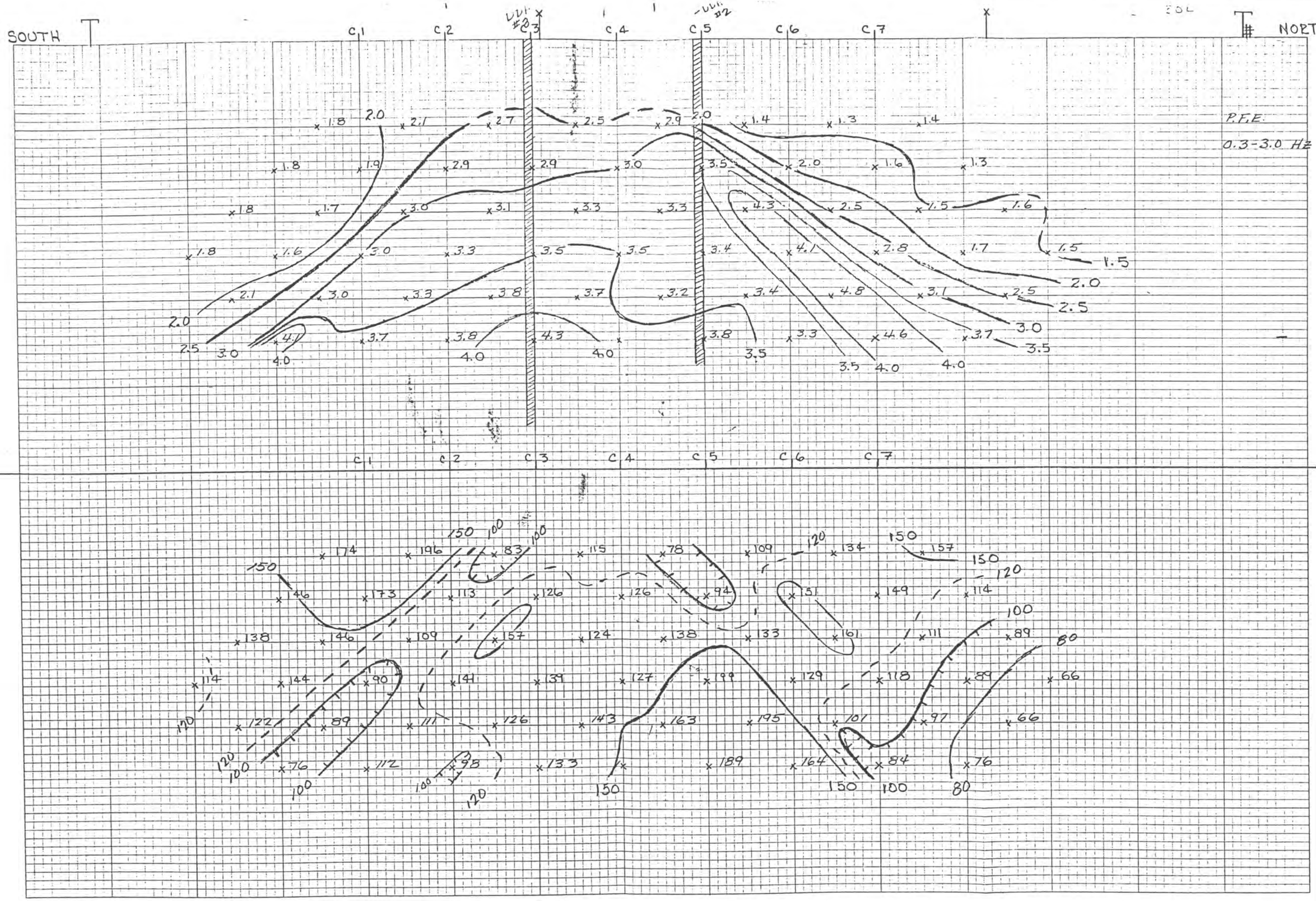

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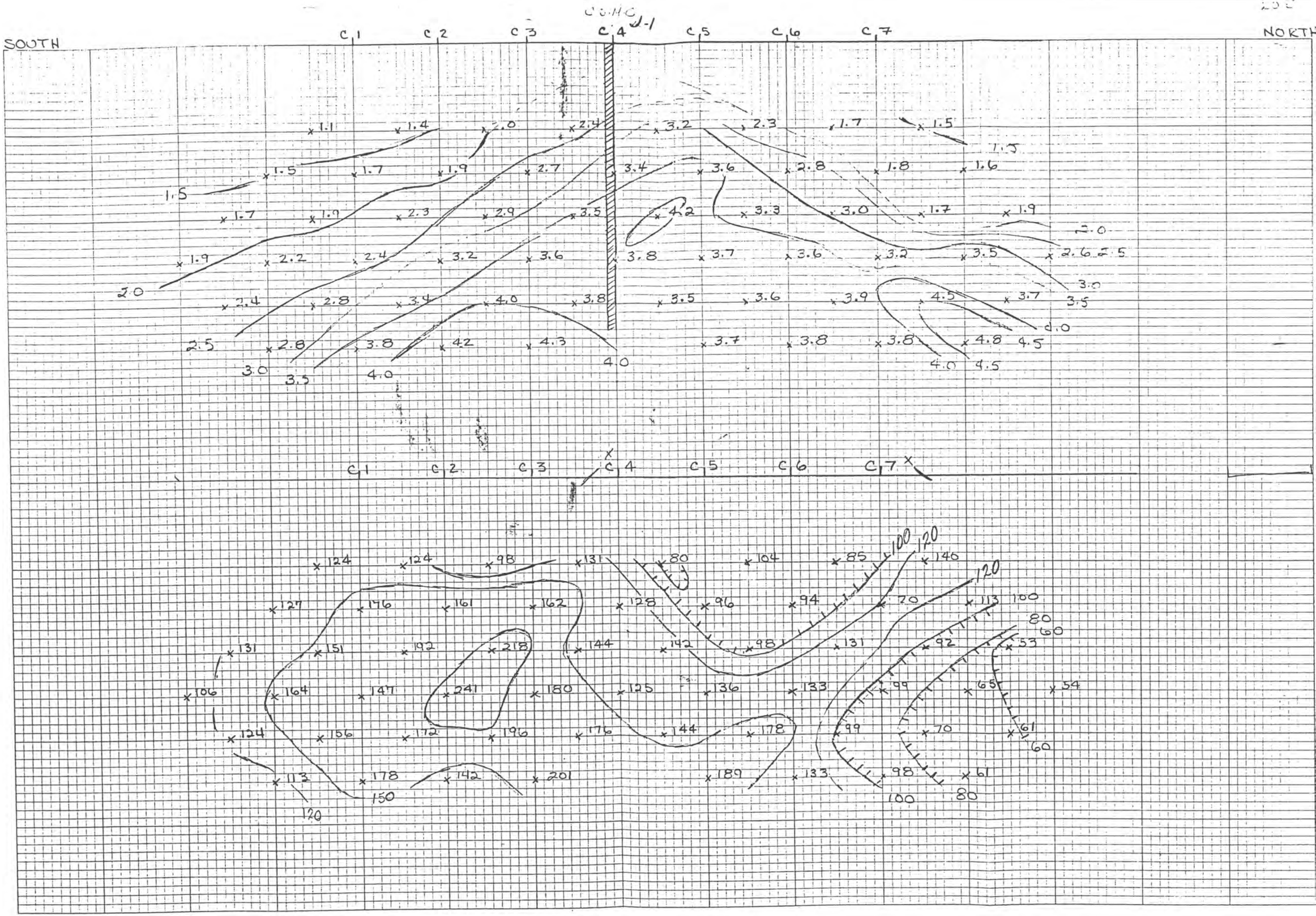

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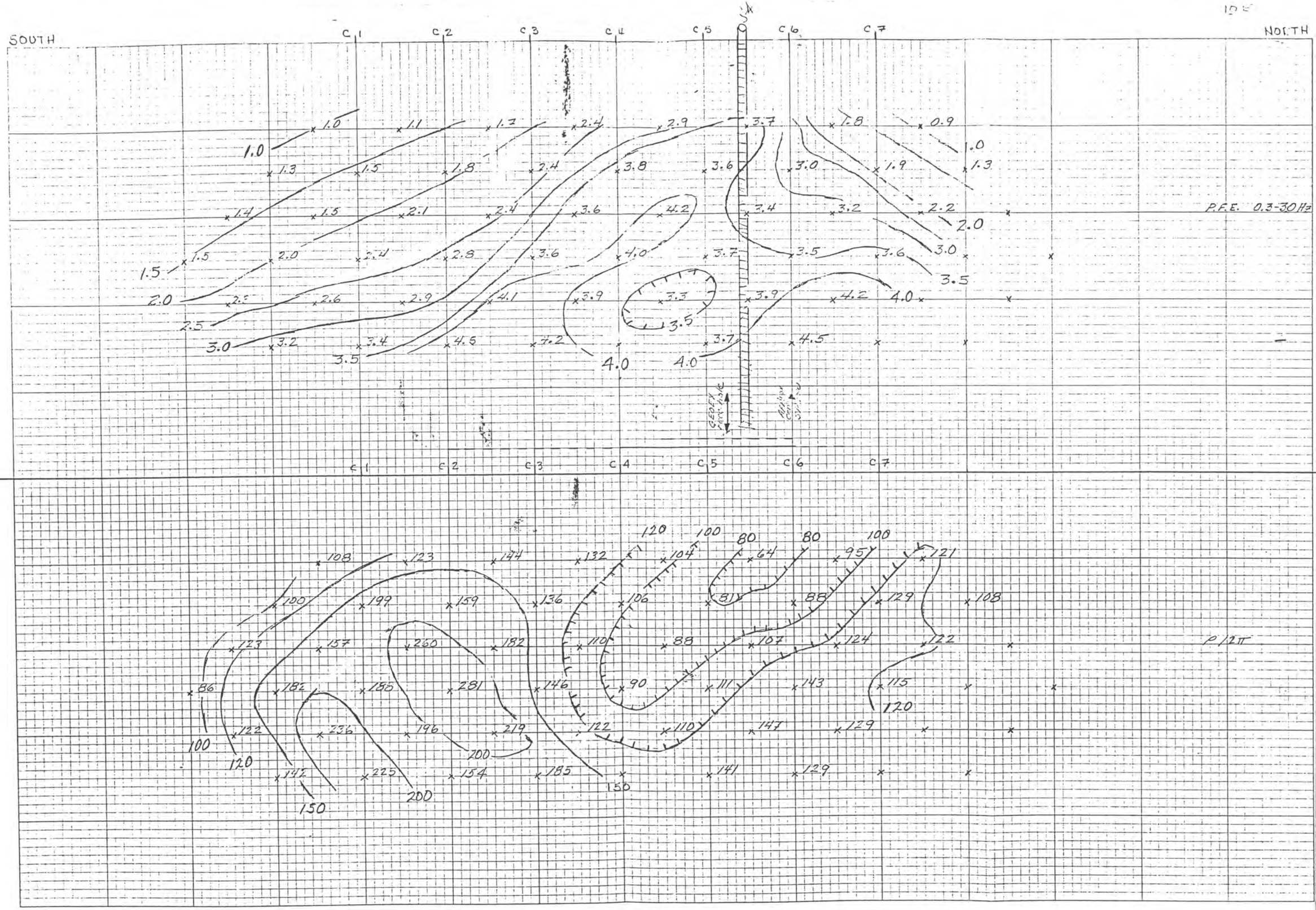

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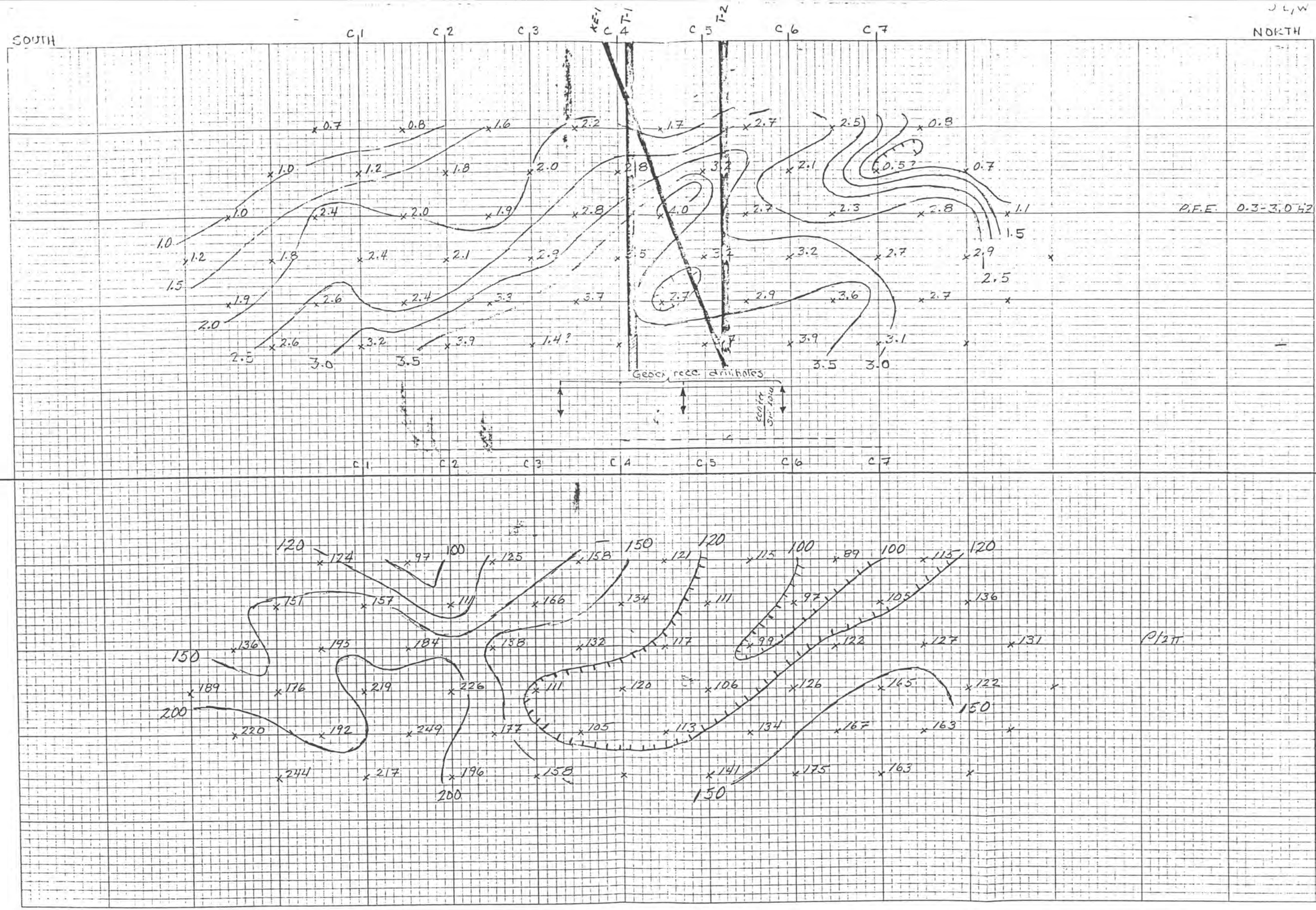

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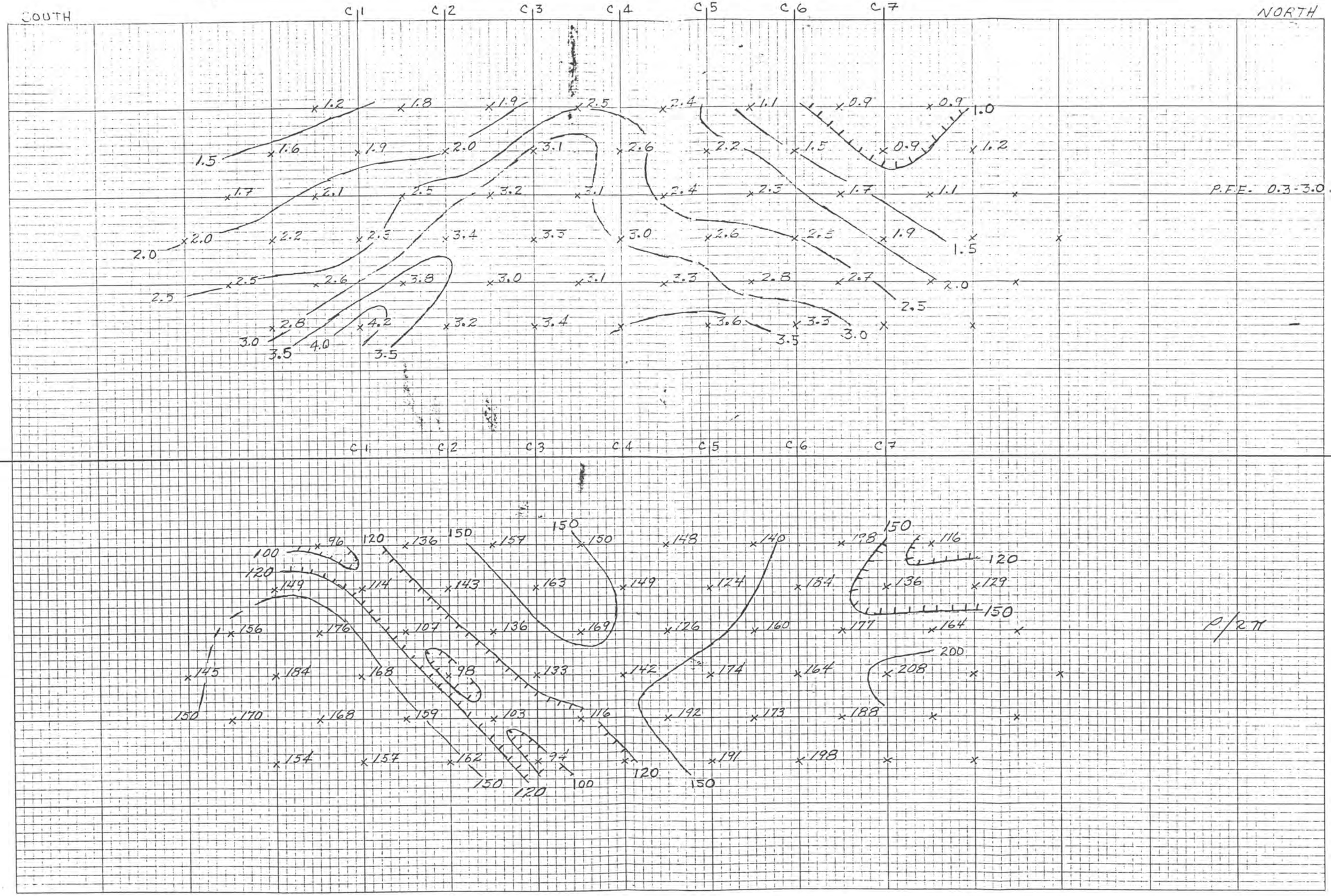
10W



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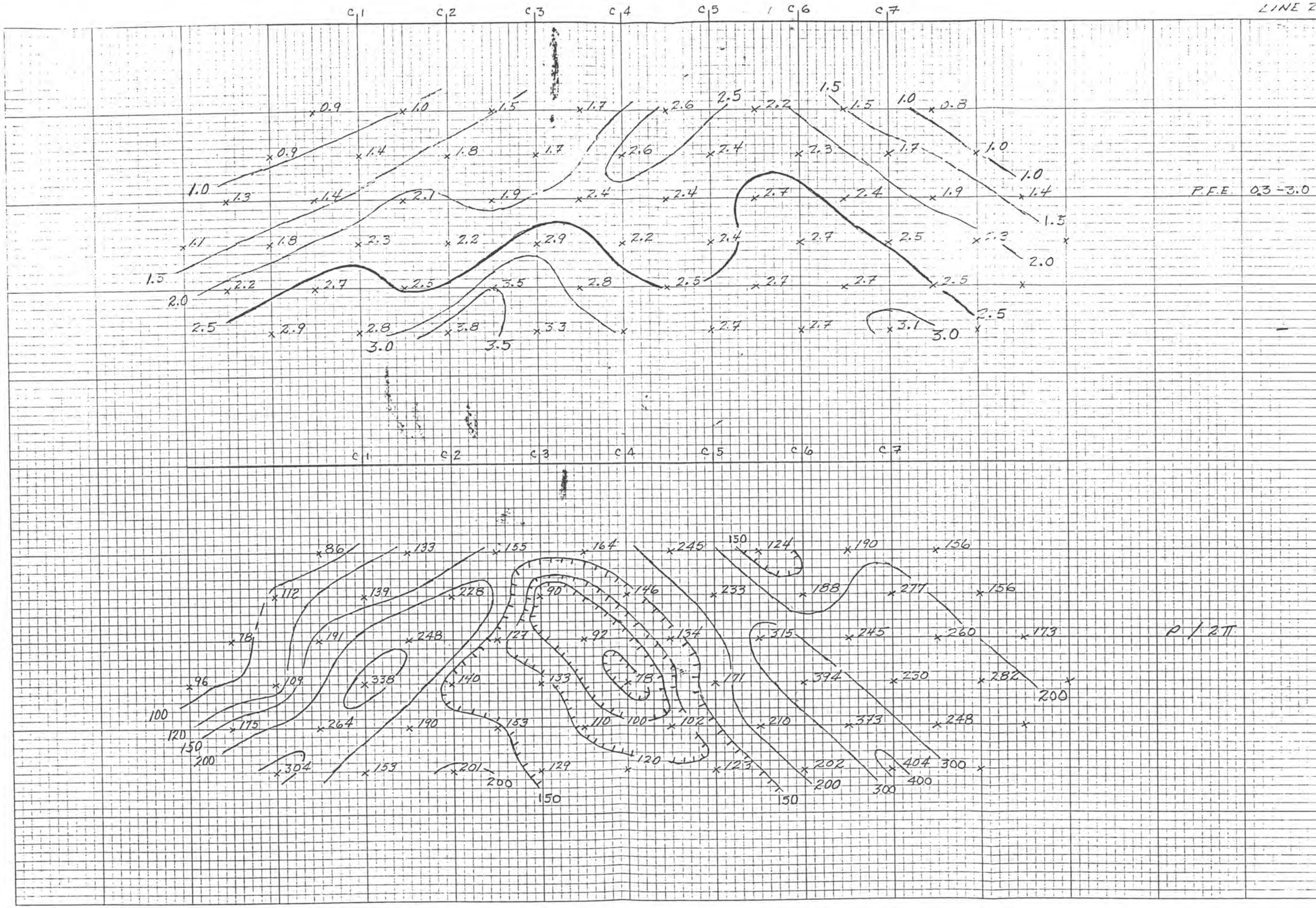

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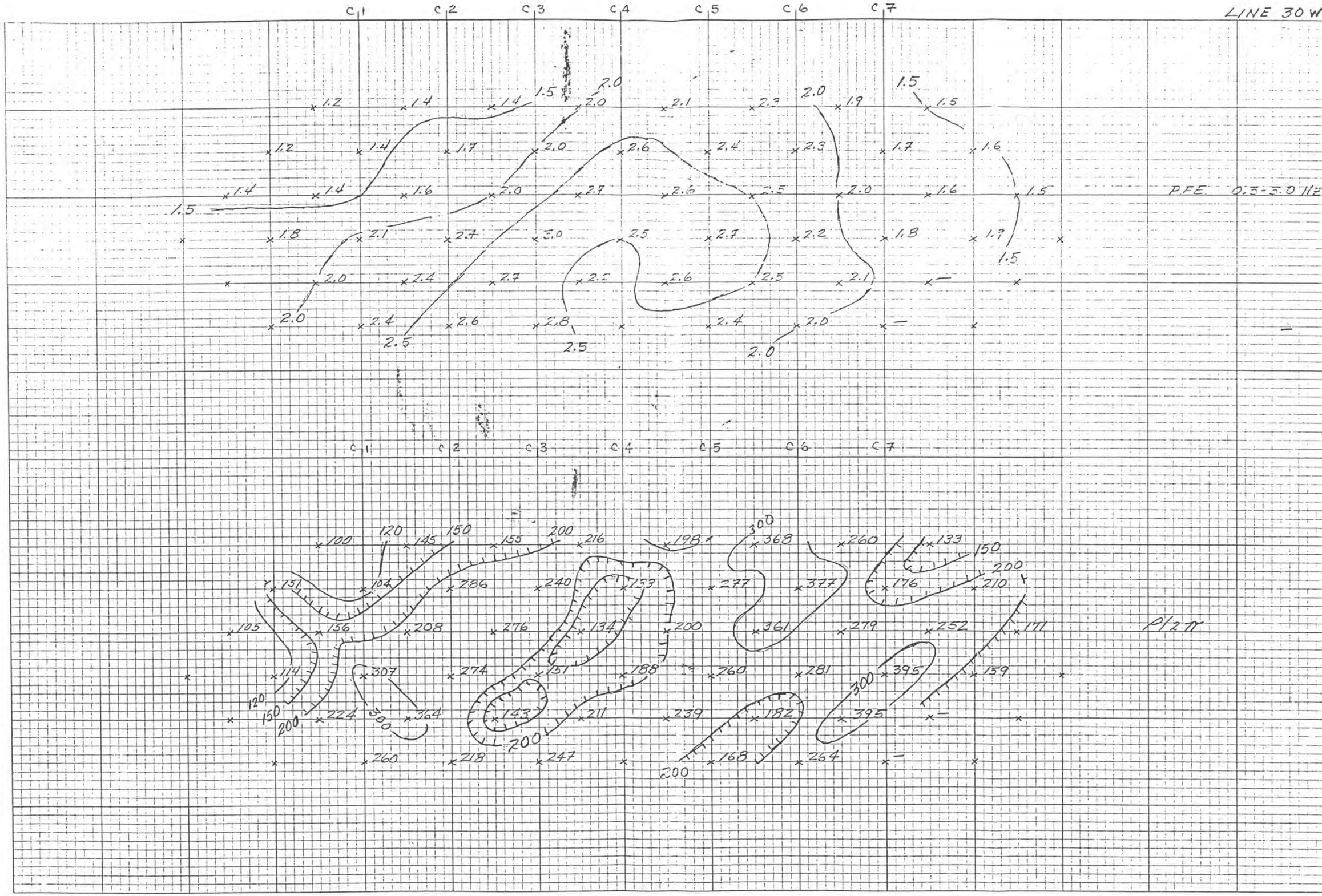

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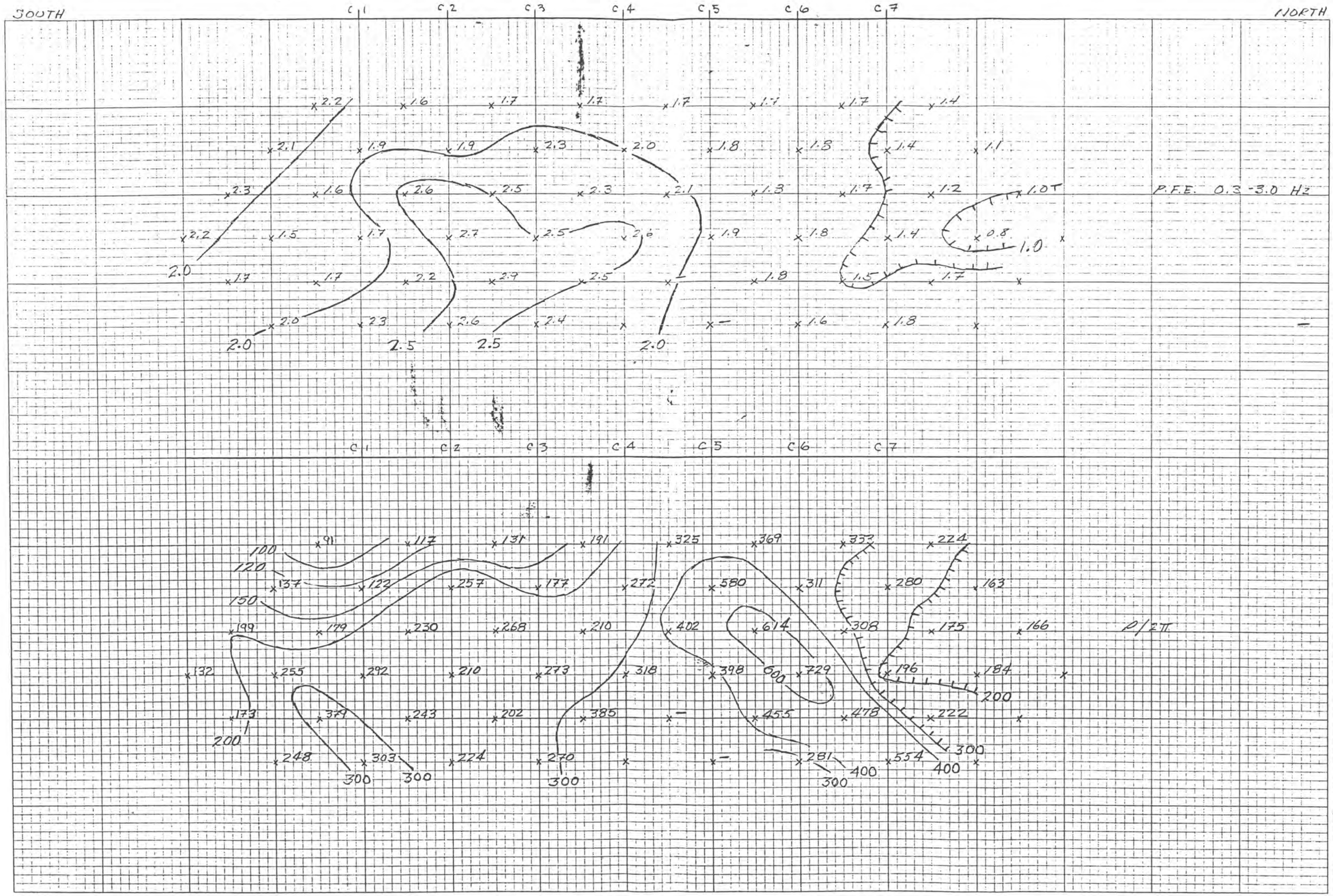

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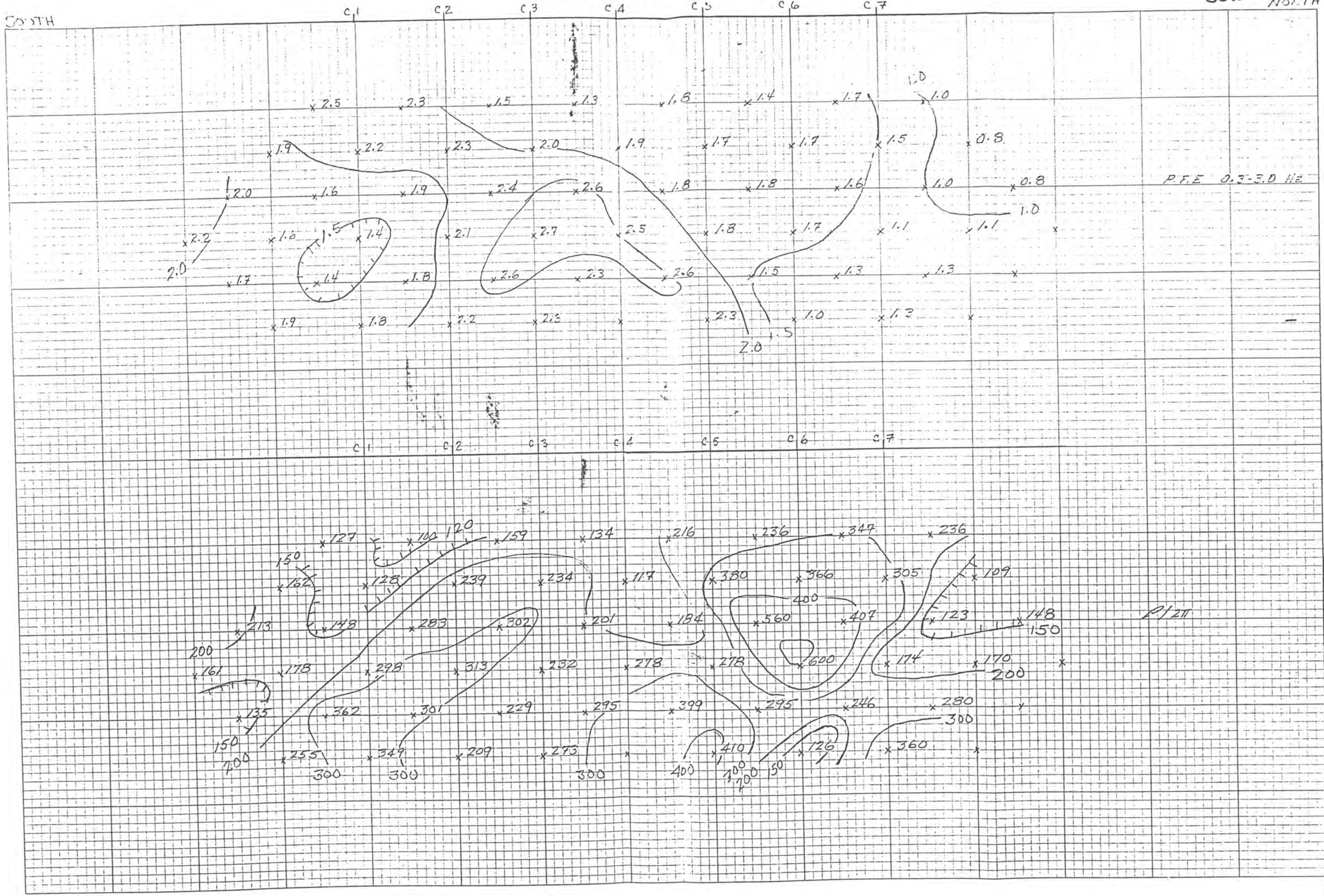

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1" = 1000'

PROJECT _____ DRILL HOLE NO. _____ SCALE _____ PAGE NO. ____ OF ____

LENGTH		ASSAYS						Miscellaneous													STRUCT.	ROCK	Summary Strip Log

PROJECT KELVIN DRILL HOLE NO. KE-1 SCALE 1" = 100' PAGE NO. 2 OF 4

LENGTH		ASSAYS (%) Cu	Mo	S	[illegible]	[illegible]/cp	Mineralization & Miscellaneous	STRUCT.	ROCK	Summary Lithology [illegible]
300										
100										
1000										
1100										
1200										
1300							1254' hole wedged off and reduced to [illegible] wireline.			
1400										
	.24	.0149	.0010	.0457	.101	1.3[illegible]				

-1534': [illegible] Teacup [illegible]: moderately porphyritic with phenocrysts of [illegible] subhedral light-colored plagioclase [illegible] prominent light gray anhedral quartz up to [illegible] inch and subhedral biotite up to [illegible] inch in a medium grained groundmass of quartz, K-feldspar [illegible] biotite and rare [illegible] up to 0.05 inch. Magnetite content from 1254-1534 = 0.23%. Overall appearance is [illegible] to light gray [illegible]. Color index approximately [illegible] to 10. Correlation with Grayback Granodiorite of Schmidt.

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE NO. KE-1 SCALE 1"=100' PAGE NO. 3 OF 4

LENGTH	% CO_3 (amp)	ASSAYS (%) Cu	Mo	S	calc wt % sulfide	py/cp
1600	.17	.0284	.0021	.1093	.233	1.8
1700						
1800	.14	.1112	.0049	.3695	.802	1.5
1900						
2000						
2100	.13	.0575	.0043	.1603	.357	1.2
2200						

Mineralization & Miscellaneous

noticable increase in pyrite below contact.

Zeolite Zone - orange stilbite logged. A second white-transparent zeolite possibly occurs below 1534, associated with CO_3-stilbite.

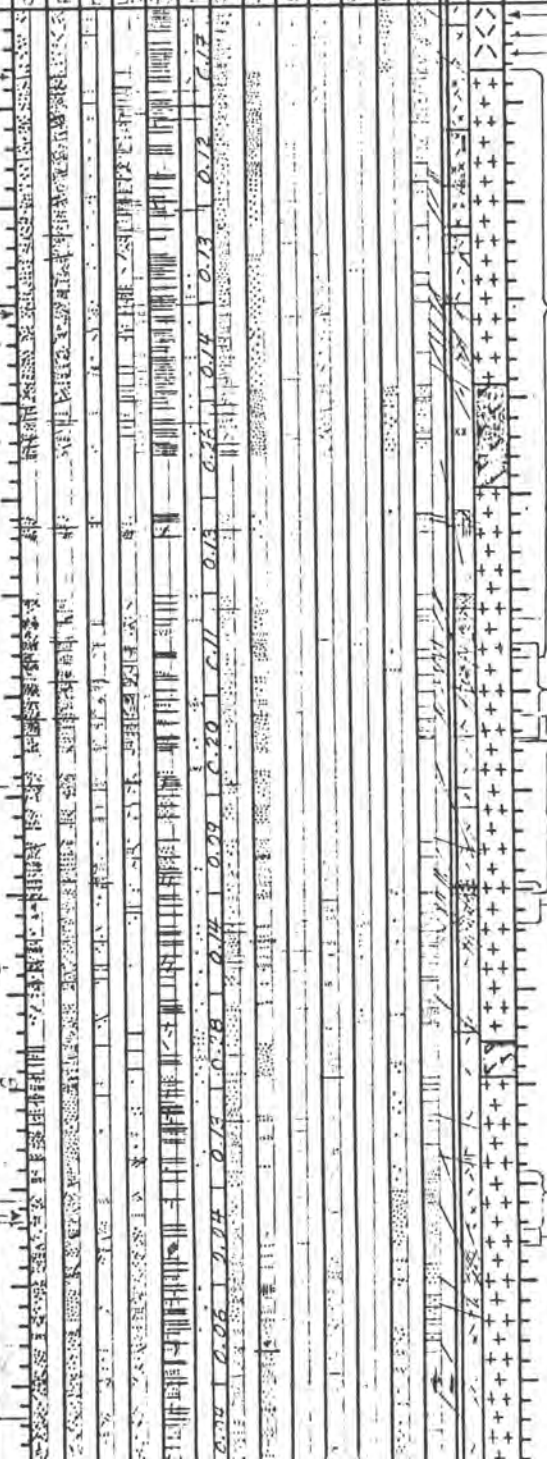
possible trace of bornite (or "tarnished" chalcopyrite

zone of apparent extremely poor core recovery

dark red-brown "limonite" occurs throughout interval 2100-2250 - occassionally along a slip or fracture but more often disseminated - possibly as a surface coating after sparse magnetite (some or all may have developed between time of drilling and time of logging.

bleb of sphalerite (?) trace bornite

nearly all sulfide mineralization occurs as fine disseminations. No true veins present. Occassional short discontinuous veinlets.



Chalcopy. | Pyrite | Molybden. | Limonite | Quartz in vein | Magnetite | Carbonate | Epidote | Green Chlorite | STRUCT. | ROCK

Summary [illegible]

[illegible]

1534-1693: Precambrian Oracle Granite: porphyritic quartz monzonite containing numerous [illegible] K-feldspar phenocrysts up to 1.5 inch in length (generally euhedral) plagioclase crystals generally euhedral average 0.25 inch to 0.5 inch in diameter, in a coarse to medium grained groundmass of quartz, K-feldspar, plagioclase biotite and minor magnetite and hornblende. Upper contact at [illegible] to core axis.

Plagioclase generally [illegible] by secondary [illegible] - interior of phenocrysts are dark blue-green in color and are generally composed of green secondary biotite and sericite in varying ratios.

1693-1747: Tertiary-Cretaceous Granodiorite Porphyry: a medium to dark gray rock with approximately 50% phenocrysts of (in decreasing abundance) [illegible] up to 0.3 inch in diameter, euhedral to subhedral plagioclase up to 0.4 inch in length [illegible] subhedral biotite up to 0.1 inch in diameter, in a fine-grained groundmass of the same minerals plus K-feldspar. Magnetite content = 0.20%. This unit generally exhibits distinct to indistinct chilled margin. There is a much more distinct variation, in this unit between phenocryst & groundmass size than there is in the Teacup Granodiorite above.

1747-2023: Precambrian Oracle Granite:

1827-1873: 46' = zone of abundant brick red limonite coating or partially coating fractures. Zinc 1820-1855 358 ppm (compared to 62 ppm above and 39 ppm below) possible location of "OTTGO" fault. Above this zone limonite is not strong and is often [illegible] [illegible] zeolite veinlets [illegible] appear [illegible]

[illegible]

zone of relatively abundant black secondary biotite sometimes completely flooding matrix [illegible] [illegible] evident where hairline veinlets [illegible] phenocrysts.

rock strongly brecciated - chlorite [illegible] fracture

2028-2046: Tertiary-Cretaceous Granodiorite Porphyry

2046-2265: Precambrian Oracle Granite

secondary [illegible] occurs mainly replacing edges of [illegible] phenocrysts [illegible] biotite strongly chloritized.

[illegible] increase.

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE NO. KE-1 SCALE 1"=1" PAGE NO. 11 OF 14

LENGTH	% P_2O_5 (comp)	ASSAYS (%) Cu	Mo	S	Calc. wt. % Sulfide	Pg/cp	Mineralization and Miscellaneous	STRUCT.	ROCK
2300							[illegible]		
2400	0.25	.0492	.0122	.1597	.348	1.5	pyrite & chalcopyrite generally occur in short discontinuous veinlets & as discontinuous—no true veins. Strong [illegible] visible [illegible] below 2212 occurs as discontinuous, along short discontinuous veinlets and more commonly as [illegible] in or discontinuous along milky quartz or quartz-CO_3 veins. Below [illegible] pyrite-chalcopyrite occurs similarly. 14 PPM Cobalt (compared to 8 PPM above)		
2500									

2278-2283: [illegible]

2265-2270½, 2346-2395, 2494-2493 } Tertiary-Cretaceous Granodiorite Porphyry

2270½-2278, 2283-2346, 2395-2420, 2422-2470 } Precambrian Oracle Granite

2420-2422, 2470-2494, 2498-2500 } Precambrian Fine-Grained Diabase

0-1254 = [illegible]XWL
1254-2500 = BXWL

PROSPECT 1 JOHNSON-[illegible]VIN
HOLE NO. KE-1 LOCATION SECTION 17, TWP. 4S., R. 11E., 75' FNL & 230' FE[illegible]
STARTING DATE 2/5/72 COMPLETION DATE 5/2/72 COLLAR ELEV. ± 2195' BEARING N 0° E INCLINATION -60°
TOTAL LENGTH 2500' TOTAL DEPTH ±2165' DRILLING CO. JOY MANUFACTURING DRILLER CYPRUS
SAMPLER GEOLOGIST CORE COND. (GOOD I, BROKEN /, CRUSHED —)

DATE	FOOTAGE	ELEV.	CORE WEIGHT	% RECOV.	LITHOLOGY	MINERALOGY PY	CPY	CC	COV	MO	[illegible]	SULF.	EP. IDO	[illegible]	SERIOT	BRECC.	% TOT.CU	OX.CU	ASSAYS PPM Mo	% Pb	% Zn	REMARKS	CORE COND.
	0	2195			ORACLE																		
	5				GRANITE																		
	10																↑		↑				
	15																.008		4				
	20																↑		↑				
	25	2173															.026		4				
	30																↑		↑				
	35																.026		4				
	40																↑		↑				
	45																.026		19				
	50	2152															↑		↑				
	55				[illegible]												.053		19				
	60				[illegible]												↑		↑				
	65				[illegible]												.023		19				
	70				[illegible]												↑		↑				
	75	2130			[illegible]												.023		19				
	80				[illegible]												↑		↑				
	85																.023		19				
	90				ORACLE												↑		↑				
	95				GRANITE												.023		7				
	100	2108															↑		↑				
	105																.080		7				
	110																↑		↑				
	115																.021		7				
	120				DIABASE												↑		↑				
	125	2087															.021		7				
	130																↑		↑				
	135				[illegible]												.180		7				
	140				[illegible]												↑		↑				
	145																.035		7				
	150	2065			DIABASE																		

COMPLETE OXIDATION

SHEET NO. 1 OF 16

PROSPECT JOHNSON-KELVIN

HOLE NO. KE-1 LOCATION PINAL CO., ARIZ

DATE	FOOTAGE	ELEV.	CORE WEIGHT	% RECOV.	LITHOLOGY	MINERALOGY PY	CPY	CC	CCV	MO	KV	SULF	EPIDO	CHLOR	SERICIT	BRECC	% TOT.CU.	OX.CU.	ASSAYS PPM Mo	% Pb	% Zn	REMARKS	CORE COND
	150	2065															↑		↑				
	155				DIABASE												.035		7				
	160																↑		↑				
	165																.035		7				
	170																↑		↑				
	175	2043															.016		45				
	180																↑		↑				
	185																.016		10				
	190																↑		↑				
	195																.016		10				
	200	2022															↑		↑				
	205																.208		10				
	210																↑		↑				
	215																.168		130				
	220				ORACLE												↑		↑				
	225	2000			GRANITE												.021		10				
	230																↑		↑				
	235																.021		2				
	240																↑		↑				
	245																.007		18				
	250	1979															↑		↑				
	255																.030		4				
	260																↑		↑				
	265																.120		4				
	270																↑		↑				
	275	1957															.037		4				
	280				DIABASE												↑		↑				
	285				ORACLE												.037		4				
	290				GRANITE												↑		↑				
	295																.006		4				
	300	1935															↑		↑				
	305																.031		4				
	310																						

PROSPECT JOHNSON - KELVIN

HOLE NO. KE-1 LOCATION PINAL CO., ARIZ.

DATE	FOOTAGE	ELEV.	CORE WEIGHT	% RECOV.	LITHOLOGY	MINERALOGY PY	CPY	CC	CCV	MO	KV	SULF.	EPIDO.	CHLOR.	SERICIT	BRECC.	% TOT.CU	OX.CU	ASSAYS PPM Mo	% Pb	% Zn	REMARKS	CORE COND
	310				ORACLE																		
	315				GRANITE												.004		4				
	320																						
	325	1914															.004		4				
	330																						
	335																.004		4				
	340																						
	345																.004		4				
	350	1892			DIABASE																		
	355																.068		4				
	360																						
	365																.030		4				
	370																						
	375	1870															.006		4				
	380				DIABASE ORACLE																		
	385																.006		4				
	390				DIABASE ORACLE																		
	395																.006		4				
	400	1849																					
	405				GRAYBACK												.048		4				
	410				GRANODIORITE																		
	415				ORACLE												.029		4				
	420				GRANITE																		
	425	1827															.029		32				
	430																						
	435				GRAYBACK												.029		32				
	440				GRANODIORITE																		
	445																.029		32				
	450	1805																					
	455																.029		5				
	460																						
	465																.152		40				
	470																						

PROSPECT JOHNSON-KELVIN

HOLE NO. KE-1 LOCATION PINAL CO. ARIZ

DATE	FOOTAGE	ELEV.	CORE WEIGHT	% RECOV.	LITHOLOGY	MINERALOGY PY	CPY	CC	COV	MO	K-V	SULF	EPIDO	CHLOR	SERICIT	BRECC	ASSAYS % TOT.CU.	OX.CU.	PPM Mo	% Pb	% Zn	REMARKS	CORE CONDITIONS
	470				GRAYBACK												↑		↑				
	475	1784			GRANODIO.												.012		14				
	480																↑		↑				
	485																.012		4				
	490																↑		↑				
	495																.012		45				
	500	1762															↑		↑	↑	↑		
	505																.040		45				
	510																↑		↑				
	515																.040		190				
	520																↑		↑	.018	.024		
	525	1740															.040		14				
	530				ORACLE												↑		↑				
	535				GRANITE												.021		5				
	540																↑		↑				
	545																.021		25				
	550	1719															↑		↑				
	555																.021		15				
	560				GRAYBACK												↑		↑				
	565				GRANODIO.												.003		15				
	570																↑		↑				
	575	1697															.044		5				
	580																↑		↑				
	585																.005		5				
	590																↑		↑				
	595																.005		5				
	600	1675															↑		↑	↑	↑		
	605																.005		5				
	610																↑		↑				
	615																.005		5				
	620																↑		↑	.005	.003		
	625	1654															.005		5				
	630																						

SHEET NO. 4 OF 16

PROSPECT JOHNSON - KELVIN

HOLE NO. KE-1 LOCATION PINAL CO., ARIZ.

DATE	FOOTAGE	ELEV.	CORE WEIGHT	% RECOV.	LITHOLOGY	MINERALOGY PY	CPY	CC	COV	MO	KV	SULF	EPIDO	CHLOR	SERICITE	BRECC.	% TOT.CU.	OX.CU.	ASSAYS PPM Mo	% Pb	% Zn	REMARKS	CORE COND.
	630				GRAYBACK												↑		↑				
	635				GRANODIO.												.005		5				
	640																↑		↑				
	645																.005		5				
	650	1632															↑		↑				
	655																.005		5				
	660																↑		↑				
	665																.005		5				
	670																↑		↑				
	675	1610															.005		5				
	680																↑		↑				
	685																.005		5				
	690																↑		↑				
	695																.012		750				
	700	1589															↑		↑	↑	↑		
	705																.012		400				
	710																↑		↑				
	715																.036		720				
	720																↑		↑	.005	.020		
	725	1567															.014		10				
	730																↑		↑				
	735																.014		10				
	740																↑		↑				
	745																.014		60				
	750	1546															↑		↑				
	755				QUARTZ												.014		4				
	760				MONZONITE																		
	765				PORPHYRY																		
	770																						
	775	1524																					
	780																						
	785																						
	790																						

SHEET NO. 5 OF 16

PROSPECT JOHNSON-KELVIN

HOLE NO. KE-1 LOCATION PINAL CO., ARIZ.

DATE	FOOTAGE	ELEV.	CORE WEIGHT	% RECOV	LITHOLOGY	MINERALOGY PY	CPY	CC	COV	MO	K-V	SULF	EPIDO	CHLOR	SERICIT	BRECC	% TOT.CU	OX.CU	ASSAYS PPM Mo	% Pb	% Zn	REMARKS	CORE COND.
	790				QUARTZ																		
	795				MONZONITE																		
	800	1502			[illegible]																		
	805																.003		6				
	810																						
	815																						
	820																				.004	.005	
	825	1481			GRAYBACK																		
	830																						
	835				QUARTZ																		
	840				MONZONITE																		
	845				PORPHYRY																		
	850	1459																					
	855																.003		2				
	860																						
	865																						
	870																						
	875	1437																					
	880																						
	885																						
	890																						
	895																						
	900	1416																					
	905																.002		3				
	910																						
	915																.015		3				
	920				GRAYBACK																.005	.015	
	925	1394			GRANODIO.												.004		3				
	930																						
	935																						
	940																						
	945																						
	950	1372																					

SHEET NO. 6 OF 16

PROSPECT JOHNSON ELVIN

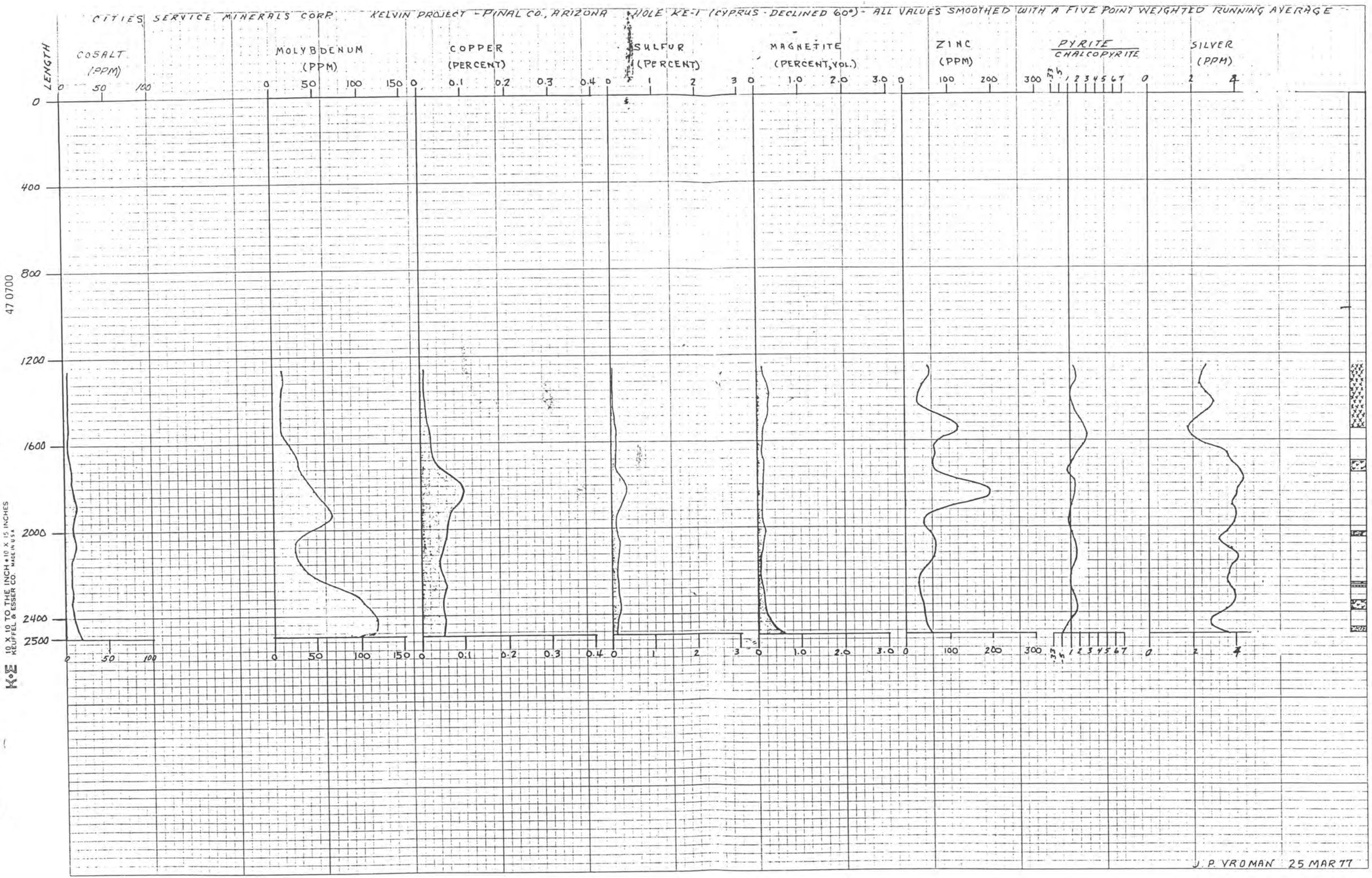
HOLE NO KE-1 LOCATION PINAL CO. ARIZ.

DATE	FOOTAGE	ELEV.	CORE WEIGHT		LITHOLOGY	MINERALOGY PY	CPY	COV	SNO	KY	SUL	EPI	DO	CHLOR			% TOT CU	% OX CU	ASSAYS PPM Mo		% Pb	% Zn	REMARKS
	950	1372												/									
	955				GRAYBACK												.011		7				
	960				SPHADIS-									/									
	965																						
	970													/									
	975	1351																					
	980													/									
	985																						
	990													/									
	995																						
	1000	1329												/									
	1005																.004		3				
	1010																						
	1015																.015		3				
	1020													/							.003	.001	
	1025	1307												/									
	1030													/									
	1035																						
	1040													/									
	1045																						
	1050	1286												/									
	1055													/			.002		4				
	1060													/									
	1065																						
	1070													/									
	1075	1264																					
	1080													/									
	1085																						
	1090													/									
	1095																						
	1100	1242												/									
	1105																.004		3				
	1110																						

PROSPECT JOHNSO[illegible] ELVIN

HOLE NO. KE-1 LOCATION PINAL CO., ARIZ.

DATE	FOOTAGE	ELEV.	CORE WEIGHT		LITHOLOGY	MINERALOGY PY						SULF	EPIDO	CHLOR			% TOTCU	CH.CU	ASSAYS PPM Mo	% Pb	% Zn	REMARKS
	1110																↑		↑			
	1115				GRAYBACK												.004		3			
	1120				GERMODIO															.006	.004	
	1125	1221																				
	1130																					
	1135																					
	1140																↑		↑			
	1145																.004		1			
	1150	1199															↑		↑			
	1155																.080		16			
	1160																↑		↑			
	1165																.048		45			
	1170																↑		↑			
	1175	1177															.012		3			
	1180																↑		↑			
	1185																.012		3			
	1190																↑		↑			
	1195																.004		3			
	1200	1156															↑		↑	↑	↑	
	1205																.004		3			
	1210																↑		↑			
	1215																.004		3			
	1220																↑		↑	.006	.003	
	1225	1134															.047		20			
	1230																↑		↑			
	1235																.047		145			
	1240																↑		↑			
	1245																.003		35			
	1250	1112															↑		↑			
	1255																.003		3			
	1260																↑		↑			
	1265																.003		3			
	1270																					


CITIES SERVICE MINERALS CORP. KELVIN PROJECT - PINAL CO., ARIZONA HOLE KE-1 (CYPRUS - DECLINED 60°) - ALL VALUES SMOOTHED WITH A FIVE POINT WEIGHTED RUNNING AVERAGE
LENGTH
COBALT (PPM)
MOLYBDENUM (PPM)
COPPER (PERCENT)
SULFUR (PERCENT)
MAGNETITE (PERCENT, VOL.)
ZINC (PPM)
PYRITE / CHALCOPYRITE
SILVER (PPM)
0
400
800
1200
1600
2000
2400
2500
47 0700
10 X 10 TO THE INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.
K+E
J. P. VROMAN 25 MAR 77

AMPAD EFFICIENCY LINE NO. 6636

CSMC KELYIN PROJECT

CYPRUS HOLE KE-1

FIVE POINT WEIGHTED RUNNING AVERAGES

	1 % Cu	2 % Mo	3 % Zn	4 % S	5 PPM Ag	6 wt % py	7 Py/Cp	8 Py+Cp	9 PPM Co	10 Vol % Cp	11 Vol % Py	12 Vol % Po	13 Mc
						weight %				Cu x 1.8363	wt Py x 0.532		
										4.2	5.02	5.13	
1240-1280 1	.0071	.0011	.0050	.023	2.6	.0302	1.5	.051	6.	.0130	.0161	.142	2.6
1280-1320 2	.0070	.0012	.0052	.025	2.4	.0337	1.7	.054	6.	.0129	.0179	.183	3.2
1320-1360 3	.0067	.0011	.0038	.021	2.3	.0270	1.4	.046	6.	.0123	.0144	.228	3.8
1360-1400 4	.0084	.0010	.0028	.022	2.6	.0249	1.0	.049	6.	.0154	.0132	.265	4.4
1400-1440 5	.0119	.0009	.0026	.031	3.0	.0363	1.1	.071	6.	.0219	.0193	.247	4.3
1440-1480 6	.0146	.0009	.0052	.048	2.7	.0614	1.5	.104	6.1	.0268	.0327	.250	4.6
1480-1520 7	.0176	.0010	.0095	.072	2.1	.1015	2.1	.152	6.2	.0323	.0540	.206	4.4
1520-1560 8	.0203	.0010	.0121	.101	1.7	.1504	2.6	.171	6.2	.0373	.0800	.174	4.4
1560-1600 9	.0211	.0015	.0086	.116	1.9	.1772	2.9	.238	5.6	.0387	.0943	.138	4.1
1600-1640 10	.0232	.0021	.0065	.111	2.6	.1639	2.4	.231	5.5	.0426	.0872	.145	4.1
1640-1680 11	.0273	.0027	.0067	.100	3.6	.1355	1.7	.214	6.2	.0501	.0721	.155	4.2
1680-1720 12	.0391	.0029	.0062	.113	3.8	.1376	1.2	.251	7.5	.0718	.0732	.186	5.0
1720-1760 13	.0615	.0034	.0068	.130	4.2	.1271	.72	.305	9.0	.1129	.0676	.187	5.5
1760-1800 14	.0894	.0041	.0118	.293	4.3	.3794	1.5	.638	9.3	.1642	.2018	.162	7.9
1800-1840 15	.1003	.0048	.0190	.338	4.1	.4430	1.5	.733	10.0	.1842	.2357	.147	8.5
1840-1880 16	.0962	.0057	.0186	.303	4.0	.3852	1.4	.663	12.1	.1767	.2049	.146	7.9
1880-1920 17	.0776	.0064	.0107	.222	3.8	.2688	1.2	.493	12.2	.1425	.1430	.140	6.4
1920-1960 18	.0680	.0068	.0053	.170	4.0	.1897	.97	.386	10.6	.1249	.1009	.142	5.5
1960-2000 19	.0624	.0056	.0042	.151	3.9	.1647	.91	.345	9.5	.1146	.0876	.177	5.7
2000-2040 20	.0600	.0037	.0055	.173	3.6	.2104	1.2	.384	10.5	.1102	.1119	.200	6.3
2040-2080 21	.0580	.0026	.0063	.197	3.2	.2593	1.5	.427	12.4	.1065	.1379	.161	6.1
2080-2120 22	.0508	.0025	.0064	.182	3.8	.2444	1.7	.391	10.4	.0933	.1300	.110	5.0
2120-2160 23	.0414	.0029	.0063	.153	4.1	.2081	1.7	.328	8.6	.0760	.1107	.073	3.9
2160-2200 24	.0416	.0035	.0047	.131	3.8	.1670	1.4	.287	8.1	.0764	.0888	.062	3.4
2200-2240 25	.0514	.0048	.0034	.134	3.7	.1570	1.1	.305	8.5	.0944	.0835	.052	3.4
2240-2280 26	.0596	.0070	.0030	.157	3.6	.1759	1.0	.348	9.1	.1094	.0936	.099	4.5
2280-2320 27	.0561	.0093	.0032	.153	3.9	.2104	1.3	.372	9.6	.1030	.1119	.138	5.3
2320-2360 28	.0506	.0103	.0037	.187	3.9	.2541	1.7	.400	9.1	.0929	.1352	.157	5.8
2360-2400 29	.0518	.0113	.0041	.194	3.5	.2657	1.8	.415	9.5	.0951	.1414	.176	6.2
2400-2440 30	.0580	.0117	.0043	.158	2.9	.1853	1.1	.353	11.2	.1065	.0986	.248	6.8
2440-2480 31	.0560	.0117	.0048	.122	2.9	.1224	0.76	.284	14.0	.1028	.0651	.395	8.4
2480-2500	.0538	.0088	.0057	.099	3.6	.0830	0.53	.238	18.4	.0988	.0442	.600	11.1

AMCAD EFFICIENCY LINE NO. 6636

1 TROY OUNCE = 34.286 PPM

* 1254-1280 not weighted

• 1780-1800 - Cuprite Assay used in composite

CSMC KELVIN PROJECT - HOLE KE-1 (CYPRUS)

INTERVAL	ASSAY 1 % Cu	2 wt % Cp	3 % S in Cp	ASSAY 4 % S	5 % S in Py.	6 wt % Py	7 TOTAL SULFIDES	8 Py/Cp	ASSAY 9 % Mo	10 % Fe_3O_4	ASSAY 11 % Zn	Skyline ASSAY 12 PPM Ag	ASSAY 13 PPM Co
* 1240-1280 1	.0060	.0173	.0061	.0145	.0084	.0157	.033	0.91	.0008	.10	.0034	<0.2	6.
1280-1320 2	.0100	.0289	.0101	.0410	.0309	.0578	.087	2.0	.0016	.18	.0089	<0.2	6.
1320-1360 3	.0037	.0107	.0037	.0145	.0108	.0202	.031	1.9	.0011	.24	.0017	<0.2	6.
1360-1400 4	.0052	.0150	.0052	.0095	.0043	.0080	.023	0.53	.0010	.28	.0029	<0.2	6.
1400-1440 5	.0168	.0485	.0170	.0370	.0200	.0374	.086	0.77	.0008	.29	.0020	<0.2	6.
1440-1480 6	.0118	.0341	.0119	.0405	.0285	.0535	.088	1.6	.0007	.28	.0018	<0.2	6.
1480-1520 7	.0162	.0468	.0163	.0595	.0432	.0808	.128	1.7	.0016	.16	.0083	<0.2	6.
1520-1560 8	.0262	.0757	.0264	.1162	.0898	.1680	.244	2.2	.0031	.22	.0242	0.2	7.
1560-1600 9	.0166	.0479	.0168	.1310	.1142	.2137	.262	4.5	.0013	.09	.0024	<0.2	5.
1600-1640 10	.0234	.0676	.0236	.1188	.0952	.1781	.246	2.6	.0020	.13	.0026	0.2	5.
1640-1680 11	.0266	.0768	.0268	.0820	.0552	.1033	.180	1.3	.0036	.13	.0112	<0.2	6.
1680-1720 12	.0286	.0826	.0289	.0980	.0691	.1293	.213	1.6	.0020	.22	.0061	<0.2	6.
1720-1760 13	.0498	.1438	.0503	.1098	.0595	.1113	.255	0.77	.0035	.22	.0032	<0.2	12.
1760-1800 14	.1125 •	.3250	.1135	.3700	.2565	.4798	.805	1.5	.0041 •	.14	.0046	0.2	9.
1800-1840 15	.1001	.2891	.1010	.3970	.2960	.5538	.843	1.9	.0046	.12	.0288	0.5	6.
1840-1880 16	.1210	.3495	.1121	.3415	.2294	.4292	.779	1.2	.0059	.17	.0279	0.2	16.
1880-1920 17	.0534	.1542	.0539	.1652	.1113	.2082	.362	1.4	.0059	.16	.0026	0.2	13.
1920-1960 18	.0719	.2077	.0726	.1805	.1079	.2019	.410	1.0	.0086	.07	.0037	<0.2	11.
1960-2000 19	.0636	.1837	.0642	.1028	.0386	.0722	.256	0.39	.0062	.18	.0026	0.2	7.
2000-2040 20	.0520	.1502	.0525	.1578	.1053	.1970	.347	1.3	.0027	.30	.0068	<0.2	7.
2040-2080 21	.0678	.1958	.0684	.2678	.1994	.3730	.569	1.9	.0018	.13	.0070	0.3	21.
2080-2120 22	.0544	.1571	.0549	.1622	.1073	.2007	.358	1.3	.0026	.10	.0046	0.2	7.
2120-2160 23	.0327	.0945	.0330	.1615	.1285	.2404	.335	2.5	.0030	.06	.0096	0.2	7.
2160-2200 24	.0348	.1005	.0351	.1082	.0731	.1368	.237	1.4	.0030	.06	.0038	<0.2	9.
2200-2240 25	.0390	.1127	.0394	.1022	.0628	.1175	.244	1.0	.0042	.04	.0018	<0.2	5.
2240-2280 26	.0972	.2808	.0981	.2118	.1137	.2127	.494	0.76	.0061	.11	.0037	0.2	8.
2280-2320 27	.0448	.1294	.0452	.1335	.0883	.1652	.295	1.3	.0017	.13	.0031	<0.2	13.
2320-2360 28	.0432	.1248	.0436	.1710	.1274	.2384	.363	1.9	.0012	.17	.0024	<0.2	6.
2360-2400 29	.0446	.1288	.0450	.2790	.2340	.4378	.567	3.4	.0120	.18	.0066	<0.2	10.
2400-2440 30	.0761	.2198	.0768	.1250	.0482	.0902	.310	0.41	.0102	.15	.0029	<0.2	11.
2440-2480 31	.0480	.1386	.0484	.1095	.0611	.1143	.253	0.82	.0175	.30	.0041	<0.2	10.
2480-2500	.0529	.1528	.0534	.0570	.0336	.0628	.216	0.41	.0033	.87	.0073	0.2	25.

AMPAD EFFICIENCY LINE NO. 1818

CYPRUS HOLE KE-1

M = moderate
S = strong
min = minor
tr = trace

L w/ JAH
CMPA 1580 ?

	PLAGIOCLASE							K-FELDSPAR							BIOTITE							COMMENTS		
	ser	chl	epi	CO_3	clay	qtz	biot	ser	chl	epi	CO_3	clay	qtz	biot	ser	chl	epi	CO_3	clay	qtz	biot		12	13
1272 1																								
1283 2																								
1341 3																								
1349 4																								
1373 5																								
1400 6																								
1469 7																								
1512 8																								
1532 9																								
1536 10	W?							W-M								S		S						
1544 11	M			W	M											tr								
1559 12	M										tr											minor ser 2nd biot vnlts.		
1580 13	M										tr					S	S	S						
1627 14	S				S			W													S	ser-CO_3 w-rn vnlts		
1640 15	S				S			W								W?		W?			M	qtz flooding w/ CO_3		
1652 16	min				W-M			min				W-M				S					min			
1676 17	S				S			W								W?		W?			S			
1693 18	tr				W																S			
1717 19	M				M											min?		min?			S			
1728 20	tr				W																M			
1761 21	S							M								tr								
1830 22	S							M								tr								
1874 23	?													M		W					S	qtz flooding		
1911 24																S					S	qtz flooding		
1932 25																S					S	"		
1952 26	?													M		W					M			
2036 27	tr				W																S			
2112 28	M							M										M						
2194 29	W						wk K-feld														M			
2260 30	S							W													tr			
2295 31	S?							tr							W	W		W						

CITIES SERVICE

INTEROFFICE LETTER

June 30, 1977

TO: J.P. Vroman

FROM: D.F.Denison

RE: X-ray analysis of pink vein material from hole KE-1: 1349'

The above noted material has been confirmed by X-ray analysis as being stilbite, as you suspected.

DFD/sc

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE KM-6 SCALE 1" = 20' PAGE NO. 1 OF 1

LENGTH	ASSAYS Cu	Mo	S	Co	Zn	Mineralization & Miscellaneous
						0-21: no core
						trace to local amounts of manganese stain along fractures.
100						
						trace copper oxides (blue)
200	.0036	.0004	.0024	.0010	.0148	
						trace amounts of manganese stain along fractures
300						
400						
	.0086	.0006	.0037	.0016	.0278	Manganese in short, discontinuous & irregularly shaped veins & veinlets (with secondary quartz) - may be a cementing material in brecciated Oracle Granite
						488-497: 5' core missing.
500						

Columns: chalcopyrite, pyrite, molybdenite, Limonite, Rock Stain & Veins, Quartz, Calcite, Fracture, Chlorite, Epidote, Feldspar, STRUCT., ROCK

Summary Lithologic Description

21-[illegible]: [illegible] with [illegible] inch in length together with some [illegible] phenocrysts that are surrounded by a matrix - grain of quartz - plagioclase - feldspar matrix.

chlorite & epidote occur as alteration [illegible] interstitial surrounding [illegible] grains.

[illegible]-[illegible] / [illegible]-[illegible] / 391-393 } Precambrian? aplite dikes [illegible] Granite [illegible] 50% [illegible] oxide [illegible]

ALTERATION: K-feldspar is generally fresh [illegible] of sericite is [illegible] in [illegible]. Plagioclase above 280' is fresh to weakly altered [illegible] it is generally strongly altered to sericite with some clay. Sericite is [illegible] fresh to moderately altered to [illegible] Biotite is strongly altered to sericite [illegible]. Sphene is also converted to sericite. Quartz [illegible] in [illegible] may be related to [illegible] mineralization.

342-345': [illegible] Granite [illegible] Plagioclase [illegible] may be [illegible] Trachyte porphyry dikes (90.5 [illegible]) [illegible]

NOTE: NO VISIBLE [illegible] as a [illegible]

LOGGED: September 26, 1975
BY: C.N. UPCHURCH & J.R. VROMAN

spudded: June 22, 1973
completed: July 6, 1973
bit size: NC 0-500'
driller: JOY MANUFACTURING
Collar: SE, SE, Sec. 9, T.4S., R13E. Pinal Co., Arizona
Collar elevation: 2200' ±
hole angle: vertical

thin section examination by: D.F. DENISON. 16 JAN 76

3441 East Milber

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS · CHEMISTS · METALLURGISTS

TUCSON, ARIZONA 85714

COMPOSITES

SAMPLE SUBMITTED BY Cities Service Minerals

DATE March 20, 1976

SAMPLE MARKED	GOLD OZ./TON	SILVER OZ./TON	PPM COPPER	PERCENT LEAD	PERCENT ZINC	PPM MOLYBDENUM	PPM Sulphur
K-6 21-50			38			3	24
51-75			238			4	32
76-100			30			2	26
101-125			29			3	11
126-150			22			2	23
151-175			34			4	13
176-200			35			7	30
201-225			45			4	29
226-250			44			5	22
251-275			32			3	28
276-300			33			5	32
301-325			32			2	12
326-350			36			6	18
351-375			52			7	36
376-400			30			4	26
401-410			49			3	29
411-420			152			3	51
421-430			41			5	36
431-440			110			6	37
441-450			122			7	26
451-460			73			9	33
461-470			195			9	36
471-480			44			7	30
481-490			43			5	32
491-500			29			5	49

Invoice # 13486

CHARGES $ 212.50 248.15 TOTAL

REGISTERED ASSAYER Arizona U. S. A. 3/22/76

ASSAYER-CHEMIST

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION		Zn ppm	Co ppm
1	K-6	21-50	50	12
2		51-75	310	10
3		76-100	75	8
4		101-125	210	10
5		126-150	140	10
6		151-175	65	8
7		176-200	70	10
8		201-225	210	10
9		226-250	600	10
10		251-275	70	10
11		276-300	65	10
12		301-325	95	10
13		326-350	100	12
14		351-375	65	10
15		376-400	90	8
16		401-410	345	10
17		411-420	270	14
18		421-430	105	14
19		431-440	110	14
20		441-450	120	14
21		451-460	660	18
22		461-470	610	18
23		471-480	320	16
24		481-490	130	16
25	K-6	491-500	105	16

TO:
CITIES SERVICE MINERALS
2002 North Forbes Blvd., Suite 102
Tucson, Arizona 85705
Attn: James P. Vroman

REMARKS:
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
7/7/77	7/8/77	771591

CITIES SERVICE

INTER-OFFICE LETTER

January 16, 1976

TO: J.P. Vroman

FROM: D.F. Denison

SUBJECT: Petrographic Examination of 14 Thin Sections From Kerr-McGee's Kelvin DDH K-6

K-6 - 29 Feet

Fresh to weakly altered, slightly porphyritic quartz monzonite containing orthoclase and microcline. Plagioclase grains are slightly larger than the other feldspars and are weakly altered to sericite, mainly in core areas. Former mafics are generally composed of iron-stained chlorite with some fresh biotite remaining. Trace amounts of epidote were noted and traces of possible secondary biotite occur in K-feldspars. Otherwise the K-feldspars are fresh. Quartz extinction is fairly sharp. Traces of opaques - magnetite (?) - occur at former mafic sites.

K-6 - 61 Feet

Probably originally the same rock type now brecciated and silicified. The K-feldspars are still fresh but former plagioclase grains are strongly altered to sericite, as are former mafics. Strong iron-staining occurs in the cracks in the quartzand throughout the rock. Quartz shows strong undulatory extinction. Some opaques remain in veinlets.

K-6 - 119 Feet

Essentially the same as K-6 - 29 feet with more quartz. Plagioclase and biotite are slightly fresher. Some interstitial quartz and K-feldspar may be granulated. Quartz extinction is weakly undulatory.

K-6 - 130 Feet

A continuation of the slightly porphyritic quartz monzonite with interstices between grains filled with fine-grained (granulated (?)) quartz and K-feldspar. Plagioclase is very fresh. Clusters of epidote are abundant. Former mafic minerals have altered to epidote and iron-stained chlorite. Quartz extinction ranges from sharp to strongly undulatory.

K-6 - 231 Feet

Ditto, K-6 - 119 Feet, with interstitial, granulated quartz and K-feldspar.

K-6 - 234 Feet

This rock appears to be broken and crushed Oracle. Plagioclase is moderately to strongly altered to sericite and biotite has bleached to muscovite some of which is iron-stained. This iron-stained muscovite may be what was called siderite in hand specimen. Small patches of secondary biotite (?) and sericite occur in cracks in microcline. Quartz extinction varies from moderately to strongly undulatory. Strong iron-staining occurs along fractures. Numerous crushed fragments of quartz and K-feldspar were noted.

K-6 - 258 Feet

Very similar to K-6 - 29 Feet with some clusters of Tourmaline. One large microcline phenocryst dominates one end of the thin section. Quartz extinction varies from quite sharp to weakly undulatory.

K-6 - 296 Feet

A continuation of Oracle quartz monzonite with plagioclase ranging from fresh to moderately altered to sericite. Biotite varies from fresh to altered to muscovite some of which is iron-stained. Quartz extinction is generally weakly undulatory. Interstitial granulated quartz and K-feldspar continues.

K-6 - 330 Feet

Ditto, K-6 - 296 Feet.

K-6 - 342 Feet

Weakly altered quartz diorite containing interlocking grains of quartz biotite, and plagioclase. Staining indicates no K-feldspar is present. The texture is fine-grained. Plagioclase is fresh to altered to iron-stained sericite which appears very "dirty" in thin section. Biotite is fresh. Quartz extinction is weakly to moderately undulatory. Disseminated magnetite commonly occurs with biotite. This rock is in contact with, or contains an inclusion of, Oracle quartz monzonite.

K-6 - 411 Feet

Coarse-grained Oracle with plagioclase strongly altered to sericite and some clay. The K-feldspar again consists of both orthoclase and

microcline. Patches of sericite were noted in microcline. Mafics have bleached to muscovite. Quartz extinction is weakly to moderately undulatory.

K-6 - 463 Feet

Ditto, K-6 - 411 Feet, with iron-staining.

K-6 - 473 Feet

Ditto, K-6 - 411 Feet, although this rock is more broken and granulated.

K-6 - 485 Feet

Generally ditto, K-6 - 411 Feet. This rock is iron-stained and the amount of clay in the sericite-clay alteration of plagioclase has increased.

DFD/js

3441 East Milber

Phone 889-5787

Kelvin K-6 Composites

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS · CHEMISTS · METALLURGISTS

TUCSON, ARIZONA 85714

COMPOSITES

SAMPLE SUBMITTED BY Kerr Mc Gee Corporation

DATE Oct. 11, 1973

SAMPLE MARKED	GOLD OZ./TON	SILVER OZ./TON	PER CENT COPPER	PPM LEAD	PERCENT ZINC	PPM MOLYBDENUM	PERCENT IRON
24950 + 24951	21 -	75		27		15	
24952 + 24953	75 -	125		32		18	
24954 + 24955	-	175		29		17	
24956 + 24957	-	225		35		14	
24958 + 24959	-	275		34		4	
24960 + 24961	-	325		30		2	
24962 + 24963	-	375		22		3	
24964 + 24965	375 -	410		75		5	
24966 + 24967	410 -	430		90		4	
24968 + 24969	430 -	450		52		3	
24970 + 24971	450 -	470		70		2	
24972 + 24973	470 -	490		89		3	
24974	490 -	500		59		4	

COPY

REGISTERED ASSAYER FLORES 10/11/73 Arizona U.S.A.

Invoice # 9920

CHARGES $ 39.00

Kelvin

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

DPAL

REGISTERED ASSAYERS

FELIX K. DURAZO
ARIZONA REG. NO. 6205
WIL WRIGHT
ARIZONA REG. NO. 5875
RICHARD M. AROS
ARIZONA REG. NO. 9072

P.O. BOX 7517
TUCSON, ARIZONA 85725

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

COPY

Kerr McGee Corporation
P.O. Box 26547
Tucson, Arizona 85726

JOB # 014733
RECEIVED 11-2-73
REPORTED 11-8-73

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD PPM	COPPER %	ZINC %		MOLYBDENUM PPM
21401			9				1
21402			10				1

REGISTERED ASSAYER
CERTIFICATE NO.
9072
RICHARD M.
AROS
DATE SIGNED
Arizona U. S. A.

CHARGE $ 7.50

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

INVOICE

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

REGISTERED ASSAYERS

FELIX K. D[illegible]AZO
ARIZONA NO. 8205
WIL WRIG[illegible]
ARIZONA NO. 5875
RICHA[illegible]ROS
AR[illegible] NO. 9072

P.O. BOX 7517
TUCSON, ARIZONA 85725

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

Kerr McGee Corporation
P.O. Box 26547
Tucson, Arizona 85726

JOB # 014735
RECEIVED 11-2-73
REPORTED 11-8-73

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD PPM	COPPER %	ZINC %		MOLYBDENUM PPM
26784			12				1
26785			18				2
26786			21				58
26787			10				4
26788			110				18
26789			11				1
26790			13				1
26791			11				1
26792			9				1
26793			11				2
2679[illegible]			8				< 1
[illegible]			9				< 1
[illegible]			9				< 1
[illegible]			8				2

REGISTERED ASSAYER
CERTIFICATE NO. 9072
RICHARD M. AROS
DATE SIGNED
Arizona U. S. A.

52.50

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

INVOICE

Kellwin

SOUTHWESTERN ASSAYERS & CHEMISTS, Inc.

DAW

REGISTERED ASSAYERS

FELIX K. DURAZO
ARIZONA REG. NO. 8205
WIL WRIGHT
ARIZONA REG. NO. 5875
RICHARD M. AROS
ARIZONA REG. NO. 9072

P.O. BOX 7517
TUCSON, ARIZONA 85725

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

Kerr McGee Corporation
P.O. Box 26547
Tucson, Arizona 85726

JOB # 014750
RECEIVED 11-6-73
REPORTED 11-9-73

SAMPLE NUMBER	GOLD OZ.*	SILVER OZ.*	LEAD PPM	COPPER %	ZINC %		MOLYBDENUM PPM
26798			10				2
26799			7				1
26800			10				2

COPY

REGISTERED ASSAYER
CERTIFICATE NO. 9072
RICHARD M. AROS
DATE SIGNED
Arizona U. S. A.

CHARGE $ 11.25

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

INVOICE

THE KELVIN PROSPECT

AN EXPLORATION PROPOSAL

FEBRUARY 1974

JAMES P. VROMAN

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ABSTRACT

The Kelvin prospect is located in the northern portion of the Tortilla Mountains and in the southern portion of Pinal County, Arizona. Kennecott's Ray mine, where 35,400 tons of 0.94% copper ore is mined daily, is located a few miles to the northeast.

The main rock type on the prospect is Precambrian granite. The granite has been intruded by quartz monzonite dikes that have been dated as Laramide in age. Since Laramide time the northern end of the Tortilla Mountains have been rotated ± 90° to the east. From this structural interpretation a porphyry copper model is developed in which a possible deposit has been turned on its side.

The prospect has been examined by other companies in the past. Their programs included geologic mapping, geophysical and geochemical surveying and drilling. One of those programs outlined an induced polarization anomaly. According to the present C.S.M.C. interpretation of all the available data neither the most favorable portion of induced polarization anomaly nor the most favorable portion of the geologic model has yet been tested by drilling.

A CE request for $75,000 is made to cover the cost of obtaining a land position and conducting a three hole drilling program in the prospect area.

LOCATION AND ACCESSIBILITY

The Kelvin Prospect is located in all or parts of Sections 8, 9, 16 and 17, T. 4 S., R. 13 E., Pinal County, Arizona. The prospect lies in the northern portion of the Tortilla Mountains and is approximately 60 miles north of Tucson, 17 miles east-northeast of Florence and within the area covered by the U. S. Geological Survey's Grayback 7 1/2 minute topographic quadrangle. The area forms a part of the Riverside Mining District which has also been known as the Mineral Creek or Kelvin Mining District.

From the bridge crossing the Gila River, approximately 1/2 mile south of Kelvin, the prospect is easily reached via a well maintained gravel road. From the bridge drive south and west approximately 3 miles to the A Diamond Ranch road and Southern Pacific Railroads access turnoff. Follow the railroad access road westerly for a distance of two miles to the entrance of Johnson Wash. A mine road extends south along the wash for a distance of one mile to the center of the property.

REGIONAL SETTING

The Kelvin Prospect is situated within the Ray-Sacaton Structural Belt (Figure 1) as defined by Schmidt (1971 b). Schmidt (1971 b) has defined this east-west trending belt on the basis of elongate quartz monzonite-granodiorite intrusive masses and numerous east-west sub-parallel dike swarms as well as similar trending mineralized fissure veins and limonite coated fractures.

This trend includes Kennecott's Ray open pit copper mine where 35,400 tons of ore averaging 0.94% copper and 79,600 tons of waste are being mined daily (Beall, 1973). Kennecott employs 2100 workers for its operations at Ray (Jett, 1972).

Two deposits located within the Belt are presently under development. Continental Oil Company has announced the discovery of 500 million tons of rock containing approximately 0.5% copper (Paydirt, 1972). It is believed that CONOCO is presently studying the feasability of bringing this deposit into production. American Smelting and Refining Company is presently removing overburden at their Sacaton operations where a 33 million ton orebody is being prepared for open pit mining and another 14 1/2 million ton orebody will be mined underground (Paydirt, 1973).

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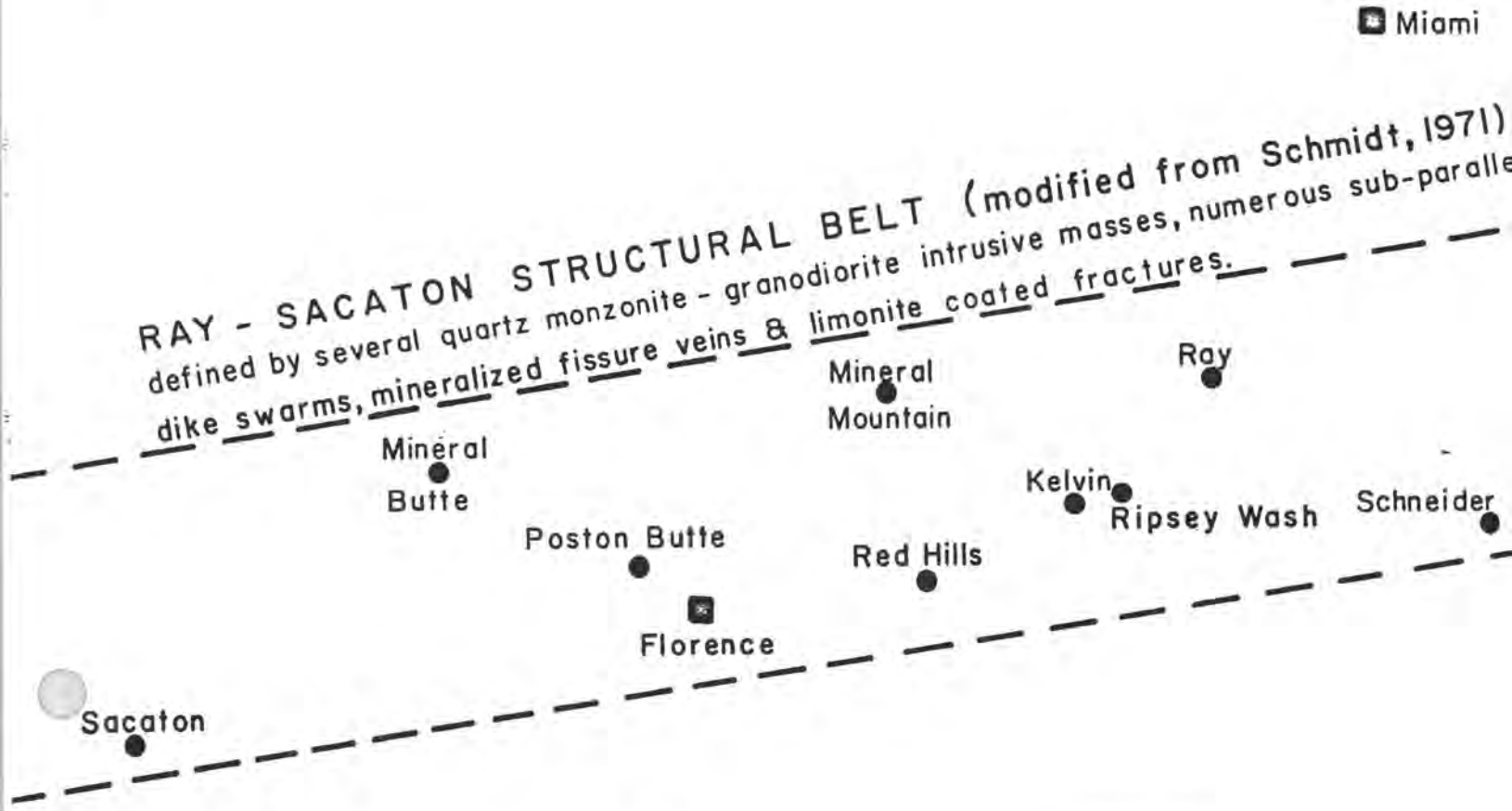

Major Production	Minor Production	Drilled Sub-marginal
Ray	Red Hills	Schneider

Major Developing	Prospects
Sacaton	Mineral Butte
Poston Butte	Mineral Mountain
	Kelvin
	Ripsey Wash

TITLE RIPSEY WASH & LOCATION MAP - KELVIN PROSPECTS

SKETCH NO. 1

Minor production within the belt has come from the Munsey Mine at Red Hills where up to 20 people have recently been employed in a small open pit mining and oxide copper leaching operation (Jett, 1971).

A large Sulfide copper mineral deposit known as Schneider Troy or Chilito is owned by Kennecott and is believed to be subeconomic at the present time.

Other prospects within the belt that have recieved considerable attention by others in the past include Mineral Mountain and Mineral Butte as well as the Kelvin Prospect.

GENERAL GEOLOGY OF THE KELVIN PROSPECT

The predominate rock type outcropping in the prospect area is the Precambrian Oracle Granite. The "granite" may more properly be termed a quartz monzonite and resembles the Ruin "granite" in the Globe-Miami area. "In hand speciman, the Oracle granite is characterized by numerous pink to red perthitic K-feldspar phenocrysits measuring up to 1 inch in diameter....Together with somewhat smaller plagloclase grains they are surrounded by a medium-grained quartz-plagioclase K-feldspar matrix. Because of this large grain size, the Oracle Granite weathers readily into a coarse regolith" (Schmidt, 1971 a, p. 18).

Several northerly striking diabase sills of younger Precambrian age have intruded the granitic basement complex. The term sill is used here even though the diabase intrusives appear dikelike on the geologic map (Figure 12 in pocket). There are two reasons for this terminology. First, the diabase sills are in general concordant with the dipping Younger Precambrian Sedimentary Apache Series rocks which are exposed outside of the immediate prospect area. Second, there is evidence that the entire northern end of the Tortilla Mountains have been rotated easterly in Post Miocene time (See "Structural Geology" below)- this means that the diabase intrusives were nearly horizontal at the time of their emplacement.

All of the Precambrian rocks have been intruded by dike swarms of Laramide age that trend east-northeasterly and which range in composition from quartz monzonite to quartz latite and rhyolite. The dikes are similar in composition and are probably related to the Grayback granodiorite stock which covers tens of square miles west of the prospect area. That stock has been dated at 62.9 $\pm$ 1.3 million years by the K-Ar method in the laboratory of Isotope Geochemistry at the University of Arizona. A

biotite quartz monzonite dike in the prospect area (SE4, SE4, SE4, Sec. 8, T.4 S., R. 13 E.) has been dated at 63.1 ± 1.3 million years by the same method. These dates are identical, within the limits of experimental error, to a date of 63 million years obtained from the Granite Mountain Prophyry Stock west of Ray which is considered to be the source for the mineralization at Kennecott's large copper deposit.

Several narrow and steeply dipping fissure veins cut the Laramide dikes and are probably a manifestation of the last phases of magmatic activity in the area during Laramide time.

Following Laramide time the area was covered by a series of Tertiary-Quaternary Sedimentary and tuffaceous deposits. Although these units have subsequently been removed they are exposed immediately outside the prospect area.

STRUCTURAL GEOLOGY OF THE NORTHERN END OF THE TORTILLA MOUNTAINS AND ITS POSSIBLE RELATIONSHIP TO THE KELVIN PROSPECT

Schmidt (1971,a) has done a detailed structural investigation of the northern end of the Tortilla Mountains. In his doctoral dissertation he presents strong evidence that the entire Tortilla Mountain range has been rotated to the east approximately 90°. The axis of rotation was approximately north-south or normal to the strike of the porphyry dike swarm and fissure veins. This rotation took place in post-miocene time and thus after the Laramide magmatic cycle was completed. Schmidt (1971, a) has found evidence for this rotation east and southeast of the Kelvin Prospect area. In these areas the sedimentary Hackberry sequence is in depositional contact with the underlying Precambrian Oracle Granite and Laramide intrusive rocks and it presently dips steeply to the east. The Hackberry Sequence has not been radiometrically age dated but it is clearly post Laramide and pre-Quaternary in age as it is unconformably overlain by the Gila conglomerate. It is believed that the Hackberry is Pliocene to Mid Miocene in age.

This structural interpretation is germane to any porphyry copper exploration in the Kelvin Prospect area. Figure 2 illustrates diagrammatically the structural development of the area and its relationship to a possible porphyry copper target within the prospect area. In pre-Laramide time the main rock type present in the area was the Precambrian Oracle Granite (Figure 2.1). During Laramide

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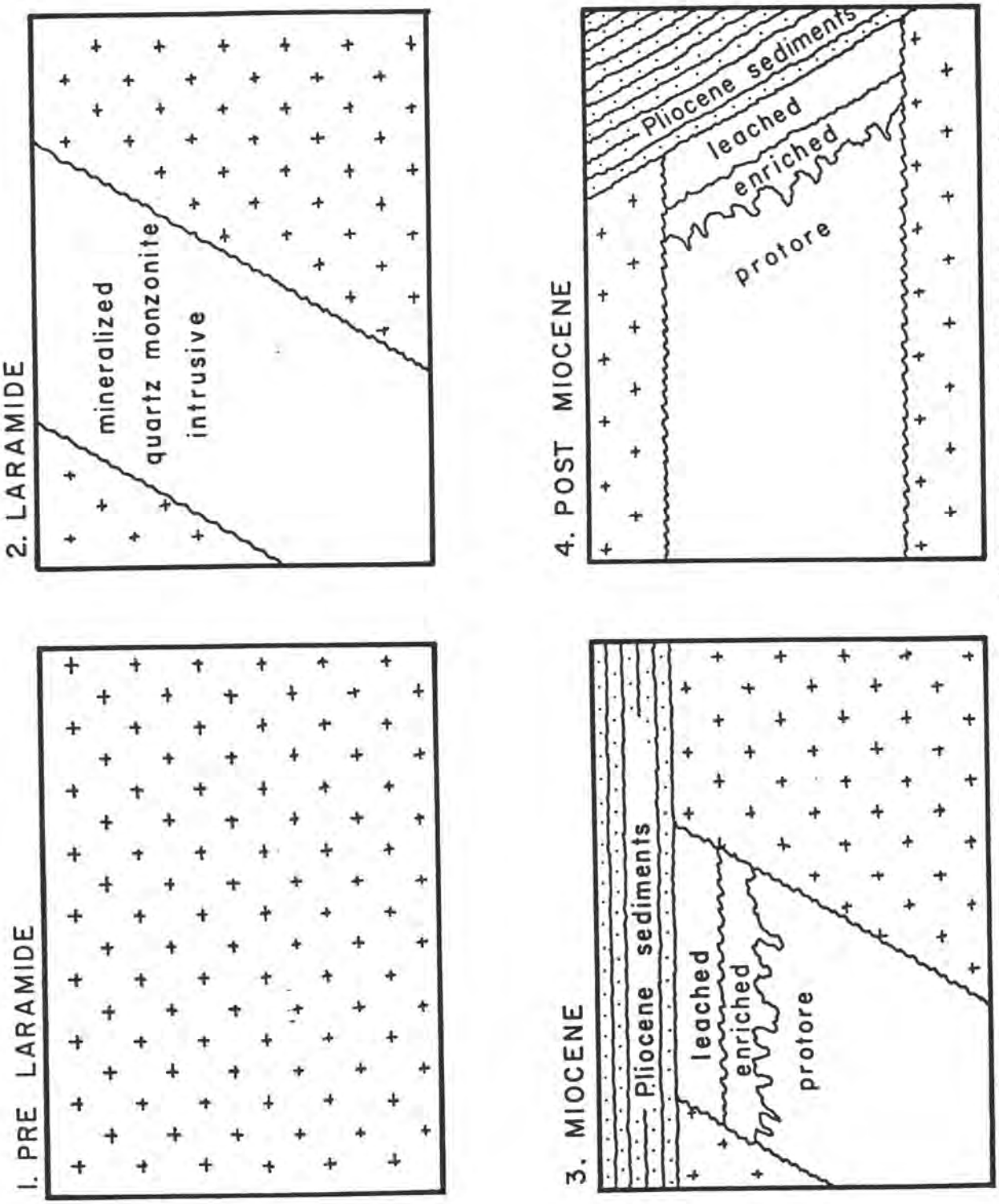


Generalized east-west cross sections showing structural development of the northern portion of the Tortilla Mountains and a hypothetical relationship to the Kelvin Prospect.

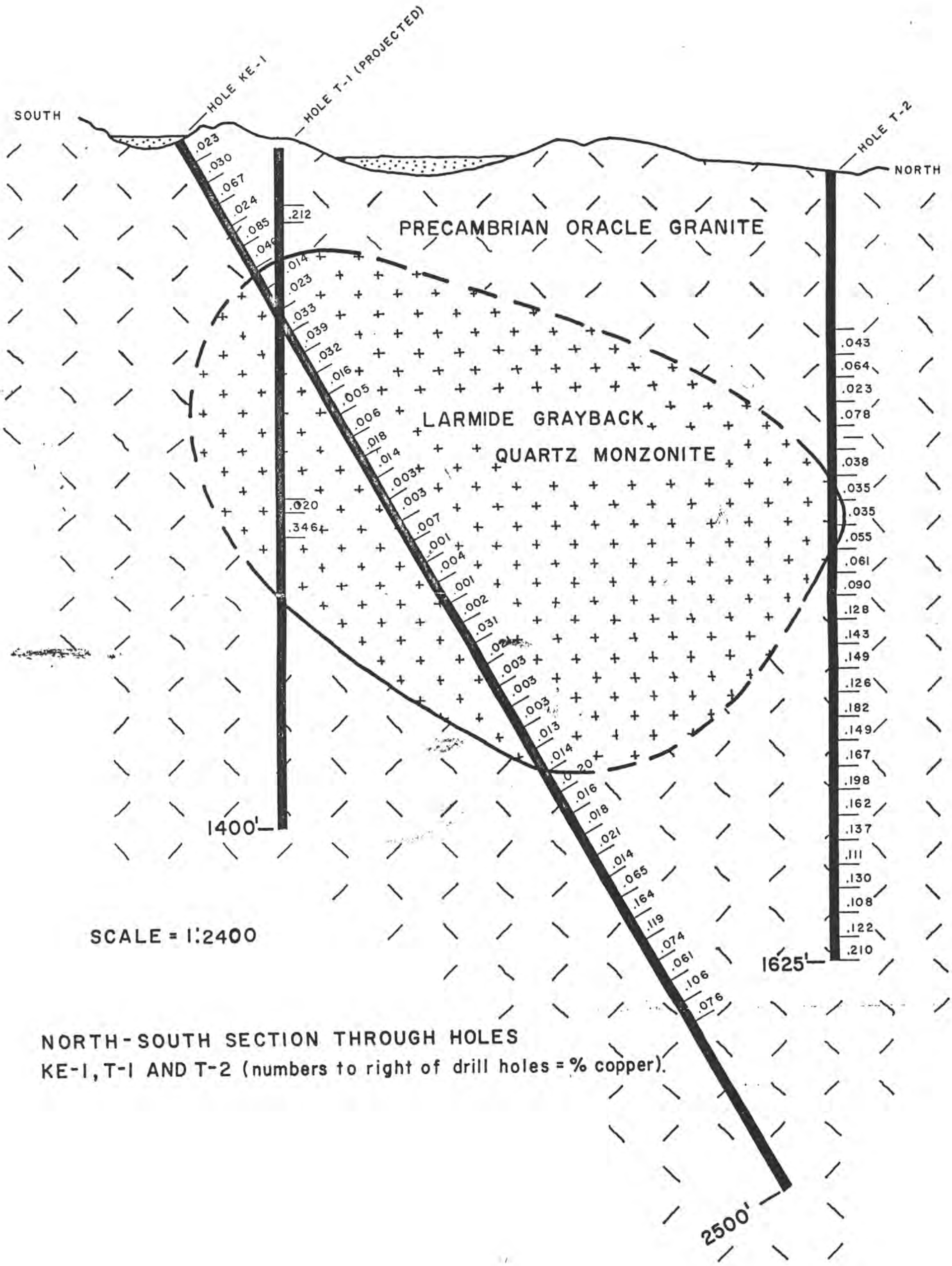
TITLE _____ SKETCH NO. 2

time the area was intruded by a mineralized quartz monzonite or granodiorite intrusive mass (Figure 2.2). This intrusive mass may have been an apophysis of the Grayback Pluton to the east and its original contact with the Oracle Granite was probably steep to vertical. The actual presence of this intrusive is indicated by the presence of the dated dike swarm and by prior drilling (see "past work" and Figure 3). Following emplacement of the mineralized intrusive the area may have undergone a period of leaching and supergene sulfide enrichment (Figure 2.3). Although there is no definite evidence of leaching exposed in the prospect area it is certainly possible as it is well documented that the Ray deposit a few miles to the northeast underwent substantial leaching and enrichment. At that deposit a chalcocite blanket containing ± 1.0% copper ore was produced from protore averaging 0.1 to 0.2% copper. Following this possible stage of development the area was covered with Pliocene or Miocene sediments and rotated to the east 60-90° (Sketch 2.4).

With this structural interpretation in mind a possible porphyry copper target in the area may be visualized as an east-west trending cylindrical intrusive mass that, in the prospect area, is presently completely enclosed by Precambrian Oracle Granite (Figure 4). What was originally the upper portion (mineralized and enriched) of the intrusive now lies to the east of its original position and is tilted on its side. Therefore the target is not the "usual" one of large areal extent and limited depth extent but rather may be expected to be narrow in areal extent and large in depth extent. West of the target area one would expect to find sub-marginal mineralization (0.1-0.2% Cu) at depth. East of the target area one would expect to find "leached capping" at depth. This model is strengthened by two facts. First, prior drilling west of the present target area encountered 0.1-0.2% copper mineralization at depth (Figure 3). Second, east of the present target area the outcropping Oracle Granite is moderately iron stained, silicified and cut by fissure veins. In light of the hypothesized model it is felt that this may by a fringe expression of significant mineralization to the west and at depth.

It should be noted that similar structural rotation is notunknown at some of the major porphyry copper deposits. Examples of major post mineralization tilting or rotation has been documented at San Manuel-Kalamazoo thirty-five miles southeast of the Kelvin Prospect as well as at Ajo, Arizona. It has also been suggested in the area of Yerington, Nevada.

KELVIN PROSPECT - PINAL COUNTY, ARIZONA



NORTH-SOUTH SECTION THROUGH HOLES
KE-1, T-1 AND T-2 (numbers to right of drill holes = % copper).

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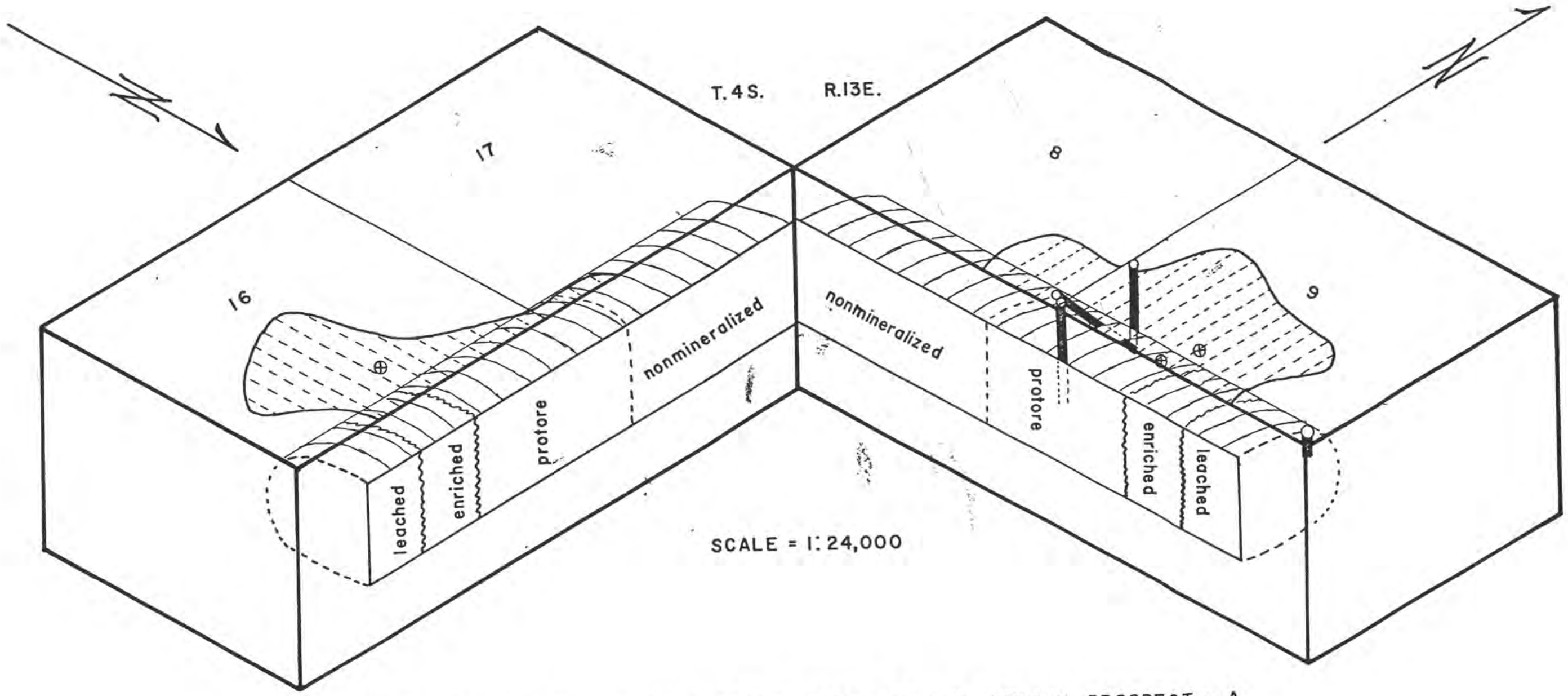
Figure 3

KELVIN PROSPECT - PINAL COUNTY, ARIZONA



ISOMETRIC DIAGRAM SHOWING HYPOTHESIZED TARGET AT THE KELVIN PROSPECT - A CYLINDRICAL BODY OF LARAMIDE AGE QUARTZ MONZONITE HAS BEEN ROTATED TO THE EAST 60°-90° SINCE EMPLACEMENT AND IS PRESENTLY SURROUNDED BY THE ORACLE GRANITE OF PRECAMBRIAN AGE. INDUCED POLARIZATION ANOMALY ON THE SURFACE (red) INDICATES UNDERLYING SULFIDE ZONE. PAST DEEP DRILLING HAS BEEN TOO FAR WEST TO TEST THE MOST FAVORABLE PORTION OF THE TARGET. PROPOSED C.S.M.C. DRILLING SITES = ⊕.

FIGURE 5

J.P.V. 1 FEB 74

HISTORY OF PAST WORK

The first written record of copper deposits in the Kelvin-Ray area was made by members of the Army of the west in 1846. The first claims in the area were staked in the vicinity of Ray in 1870. The first attempt at production at Ray was made in 1880 but was short lived. The Ray deposit has now been in continuous production since 1911 (Metz & Rose, 1966).

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 ore was shipped from that claim during the period 1920-1930. In 1933 Mr. Arnold H. Johnson located several "Black Copper claims" and prospected surficial indications of copper and gold. Johnson has continued prospecting the area to the present day. During 1953-1957 Johnson located additional claims in the area on encouraging surface shows of copper and molybdenum. During this same period he sank two sixty foot shafts on the molybdenum rich "Rare Metals Vein". This was the last attempt at any small scale production from the property (Zelinski, etal. 1970).

It is reported that Inspiration Consolidated Copper Company ran two Induced Polarization lines across the property in 1967. Mr. Arnold Johnson has reported that this work was done without his prior knowledge or permission. The results of that survey has not been made available to Johnson or C.S.M.C.

Minbanco acquired the property and did some exploration drilling during 1968-1969. It has been reported that Minbanco drilled nine hammer holes during that time. The drilling was confined to a small area considerably to the west of the presently defined C.S.M.C. target. It is felt that their drilling procedures and sample recovery techniques were poor and do not aid materially in an evaluation of the prospect.

Tipperary Resources Corporation acquired the prospect in late 1969 and conducted a fairly detailed exploration program through 1970. Their program involved geologic mapping, geochemical sampling, a ground magnetic survey, a detailed induced polarization-resistivity survey, and the drilling of two rotary holes on the property. Most of these data have been made available to C.S.M.C. The ground magnetic survey data is considered to be of no help in our present program-the data indicate that the area was surveyed with a malfunctioning Vertical field ground magnetometer. The geochemical maps are of marginal interest. What appear to be anomalously high concentrations of both copper and

molybdenum occur in an east-west band across the property and may conform to the east-west area of dike swarms. Although the geochemical maps are not a prime factor in our present interpretation of the prospect it is encouraging to note that our immediate area of interest is high with respect to trace amounts of copper and molybdenum. The most useful Tipperary data made available to C.S.M.C. are the results from a detailed induced polarization survey (described in detail under "Induced Polarization" below) and their two hole rotary drilling program.

Cyprus Mines Corporation optioned the property in the first half of 1972 and drilled one core hole inclined -60° to the north on the property. This hole was collared in the vicinity of Tipperary's first hole, was drilled for a total length of 2500 feet and bottemed below Tipperary's second hole (see Figure 3). Cyprus drilled into what they believed was the strongest portion of the Induced Polarization anomaly. Logs and assays of the two Tipperary holes and the Cyprus hole (KE-1) reveal two facts that are important to an interpretation of the prospect area. First, an intrusive mass of quartz monzonite-granodiorite, inferred to be of Laramide age, was intersected at depth (Figure 3). Secondly, two of the holes clearly show an increase in copper mineralization (to 0.1-0.2% Copper) at depth. Although this is not ore grade mineralization it is comparable to the grade of the protore at Kennecotts' Ray Mine to the northeast. According to our present interpretation all of these holes have been drilled too far to the west (i.e. too low in the deposit) to have intersected a possible enriched zone (Figure 4).

Kerr McGee was the last company to do any exploration work on the prospect area. It is believed that the only appreciable work done by them was drilling of one 500 foot core hole in the SE4 SE4 of Section 9, T. 4 S., R. 13 E. This hole was drilled east of the main portion of the Induced Polarization anomaly and was not drilled deep enough to test the anomaly. The core from this hole has been made available to C.S.M.C.

INDUCED POLARIZATION

Detailed Induced Polarization-Resistivity data from a survey completed in 1970 by Heinrichs Geoexploration Company of Tucson, Arizona for Tipperary Resources has been made available to C.S.M.C. by the present property owners, Messrs. Arnold and John Johnson. Eleven north-south lines spaced approximately 1000 feet apart were run (Figure 5). All of the lines were run using a stand-

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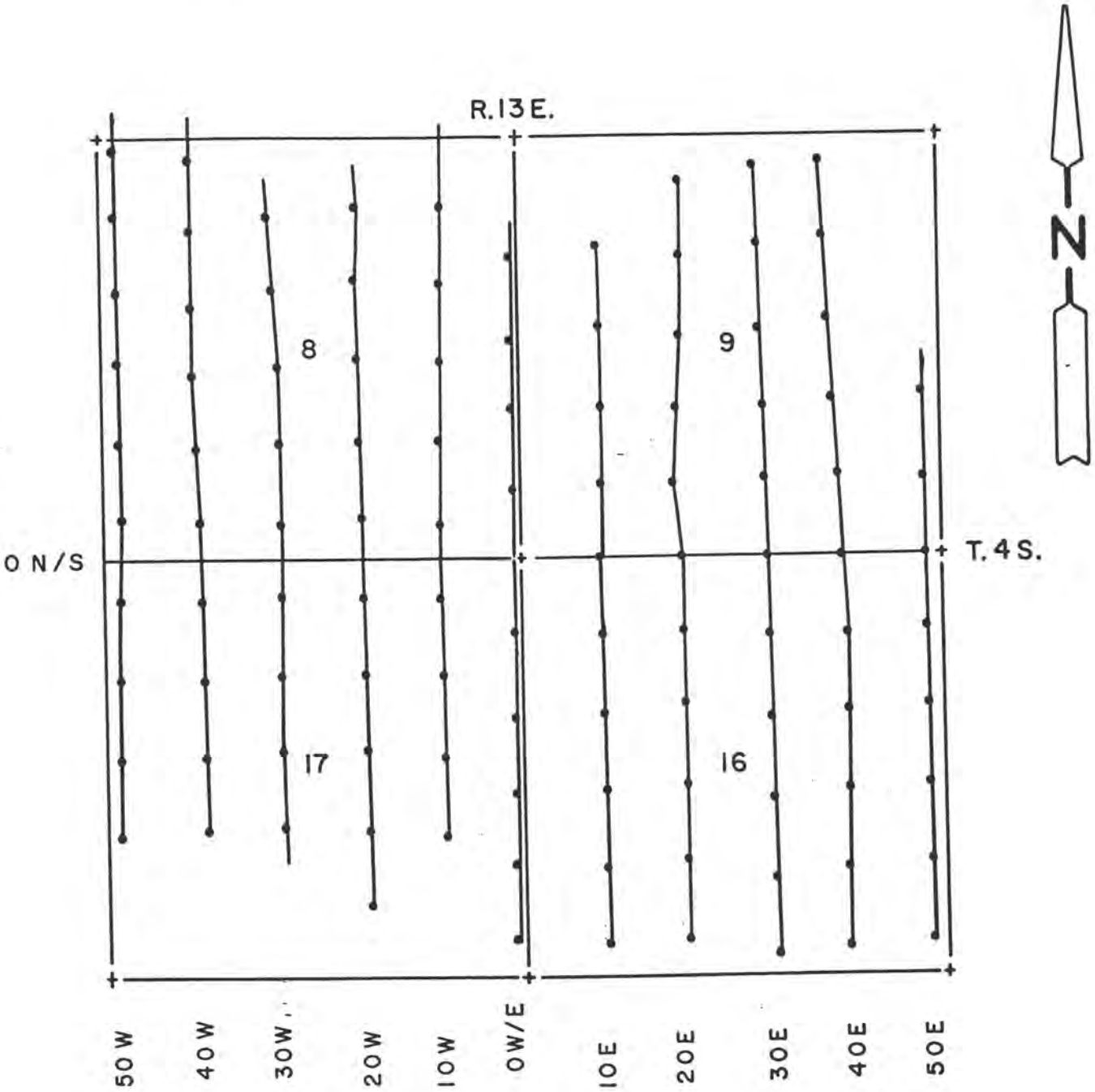

TITLE KELVIN PROSPECT - INDUCED POLARIZATION LINES SKETCH NO. 5

ard dipole-dipole electrode configuration with a dipole length ("a" spacing) of 1000 feet. In addition lines 10 W, 0 E/W and 10 E were surveyed using a 500 foot "a" spacing. The separation between the sending and receiving dipoles was varied from 1 to 6 times ("n"=1-6) the "a" spacing. The data, as prepared by Heinrichs, was presented in pseudo-sections. The data appears to be of good quality and not seriously affected by electromagnetic or induced coupling effects. The apparent Percent Frequency Effect was calculated from the change in resistivity values measured at 0.3 and 3.0 c.p.s.

These data have been reinterpreted by the C.S.M.C. staff. The reinterpretation involved plotting and contouring the values of apparent Precent Frequency Effect at the first, third and fifth separations (n=1,3 & 5). These plots (Figures 6, 7, and 8) clearly indicate that the three deep holes (Tipperary 1 & 2 and Cyprus KE-1) were drilled at the extreme western edge of the Induced Polarization anomaly; and that the Kerr McGee hole was too far east and/or too shallow to test the anomaly. The depth to the top of the chargeable body causing the anomaly has been estimated by comparing actual values determined in the field during the survey to standard theoretical curves. Figure 9 is an example of this curve matching technique as applied to the data from the prospect area.

The reinterpretation of the data by the C.S.M.C. staff indicates that the Induced Polarization anomaly present on the prospect area is real, is related to sulfide mineralization that may be of economic significance, and has not been adequately tested by drilling. Depth to the top of the anomaly producing body, near the center of the area of present interest is interpreted to be approximately 500 feet but may be as much as 1000 feet.

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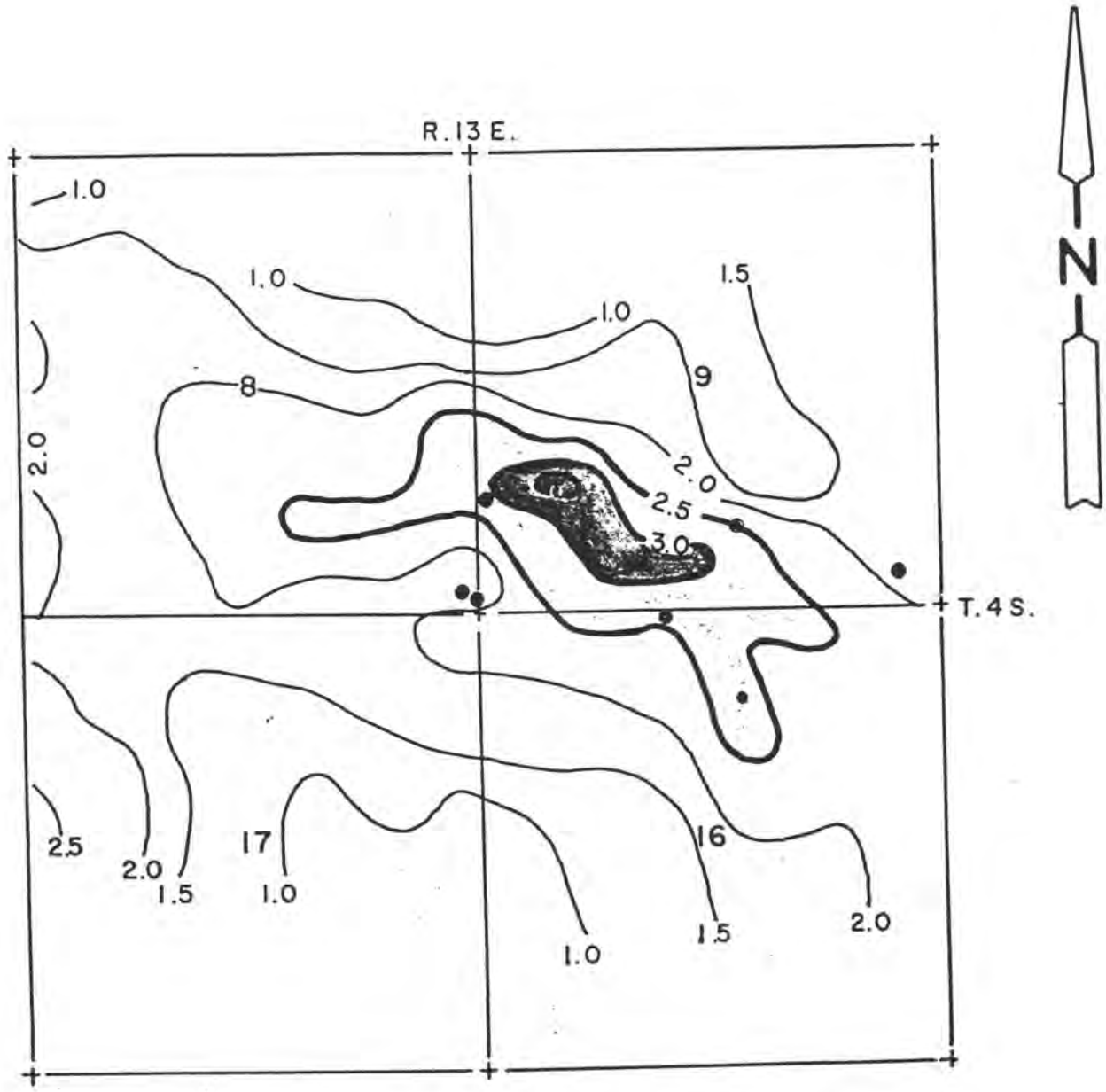

contour interval = 0.5 P.F.E.

● = existing drill hole

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT AT "n" = 1 SKETCH NO. 6

(P.F.E. over 2.5 % in red)

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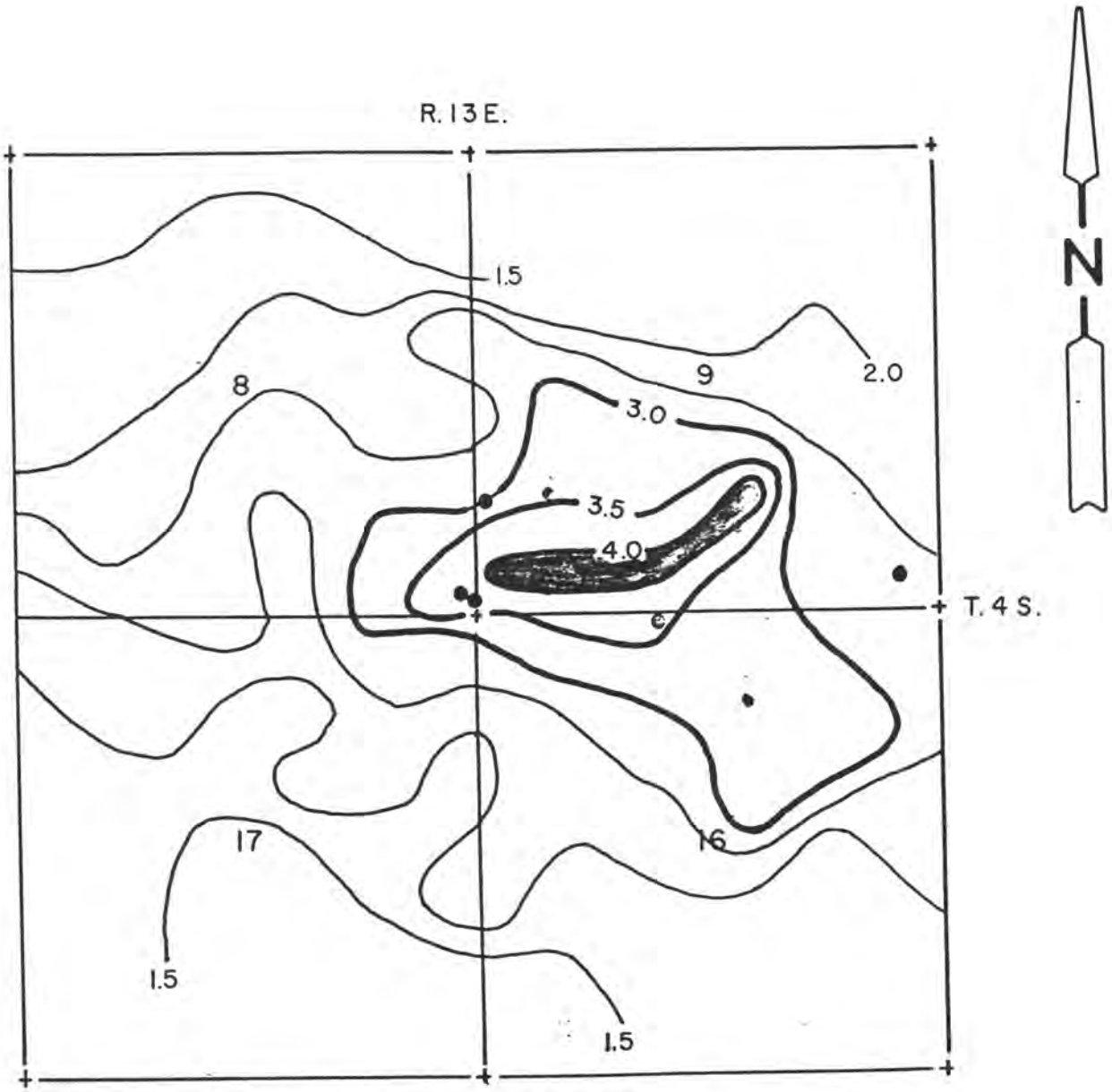

contour interval = 0.5 P.F.E.

● = existing drill hole

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT AT "n"=3 SKETCH NO. 7
(P.F.E. over 3% in red)

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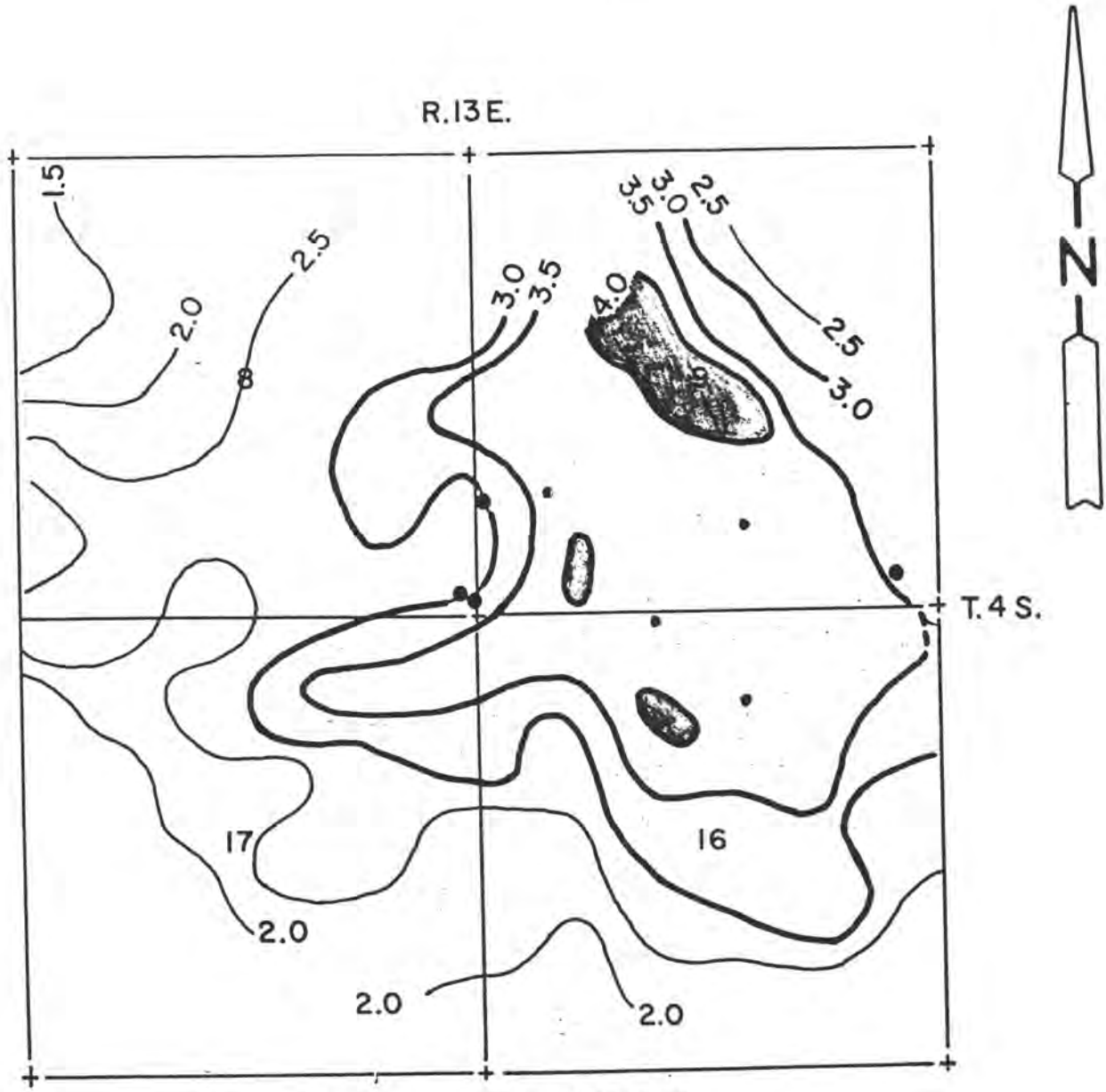

contour interval = 0.5 P.F.E.

= existing drillhole

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT SKETCH NO. 8
AT "n" = 5 (P.F.E. over 3.0 % in red)

K+E LOGARITHMIC 46 7523
2 X 3 CYCLES MADE IN U.S.A.
KEUFFEL & ESSER CO.

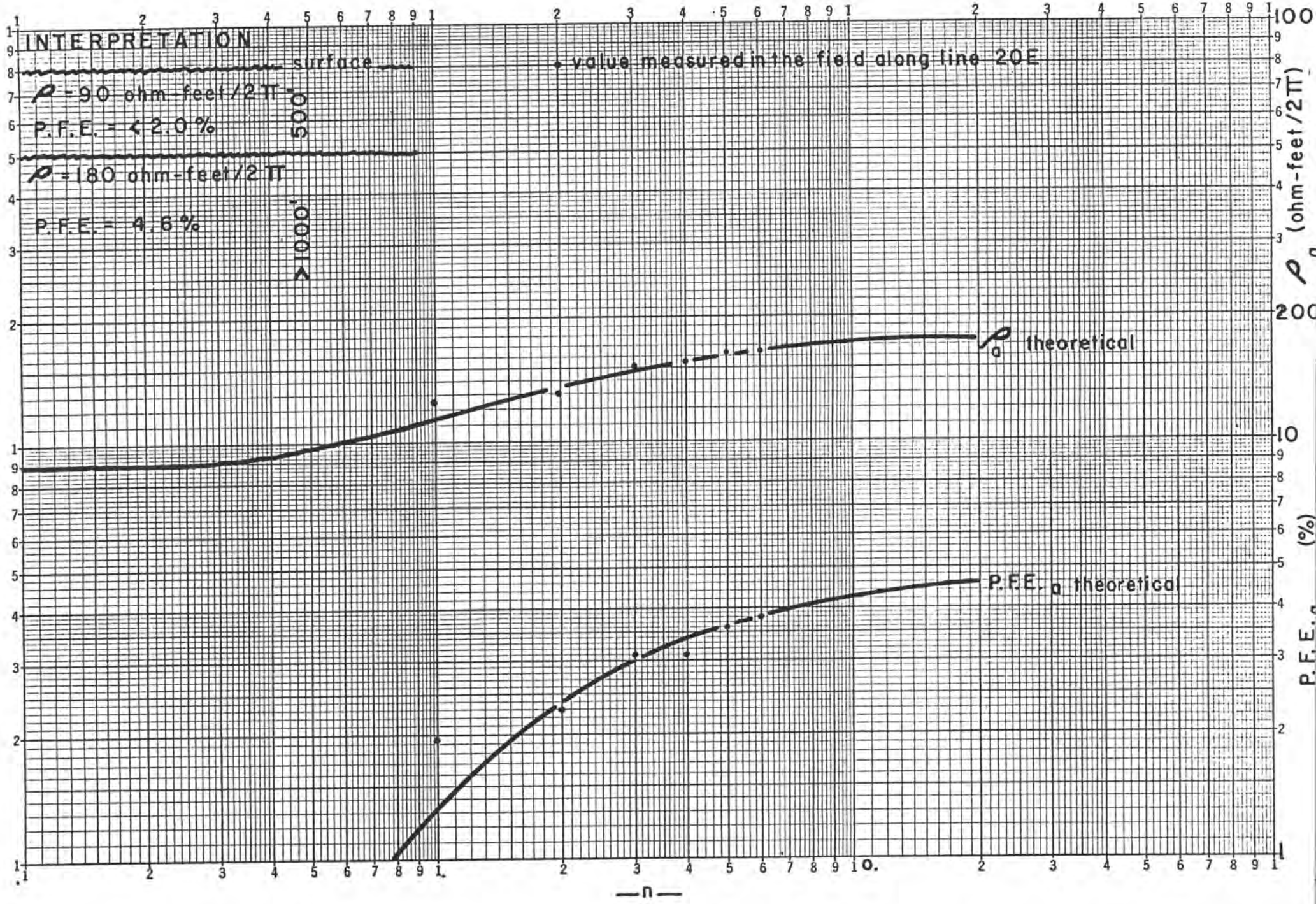

figure 9

J.P.V. 29 JAN 74

LAND STATUS

Subsurface: There are three groups of holdings of interest to C.S.M.C. (See Figure 10). The Johnson group of 57 unpatented lode mining claims covers the major portion of the area of interest. This group is owned by Mr. Arnold H. Johnson, etux. and their son Mr. John Johnson. The Johnson's live in Mesa, Arizona and have been contacted by Mr. Wilson Walker, C.S.M.C. landman. The Johnsons are asking $6000.00 for a one year exclusive option on the property. These payments could probably be paid in four quarterly $1500.00 installments. The Johnsons have set an upset purchase price of $750,000 on the property and the terms regarding length of the payment period are negotiable. The Johnsons have been most cooperative and seem to be very reasonable people to deal with.

Tipperary Resources corporation (500 West Illini, Midland, Texas 79701) are the owners of record of the Zelleweger patented lode mining claim (MS 3314-20.661 acres) located in the S 1/2, SW 1/4, Section 9.

Mr. James W. Sharpe holds a valid state prospecting permit (PP 25685) on the N 1/2 of Section 16. The permit is presently valid until November 20, 1974.

Neither Tipperary nor Sharp have been contacted by C.S.M.C. It is presently believed that the best time to approach these two parties would be immediately after concluding an agreement with the Johnsons. For the purpose of this request it is assumed that agreements, similar to the Johnson agreement, will be able to be concluded between Tipperary, Sharp and C.S.M.C.

Surface: At the present time it is believed that there are three groups of surface holdings within the area of interest (see Figure11). Tipperary controls the surface on their patented claim, the N 1/2 of Section 16 is owned by the State of Arizona and the remainder of the area by the Federal government. The exact status of this land and the names of any surface leasees is presently being investigated by Mr. Walker.

PROBLEMS

As with any exploration program many problems may be encountered before its completion. It is felt that the possibility of two such problems should be mentioned at tims time.

Although it is felt that the induced polarization anomaly

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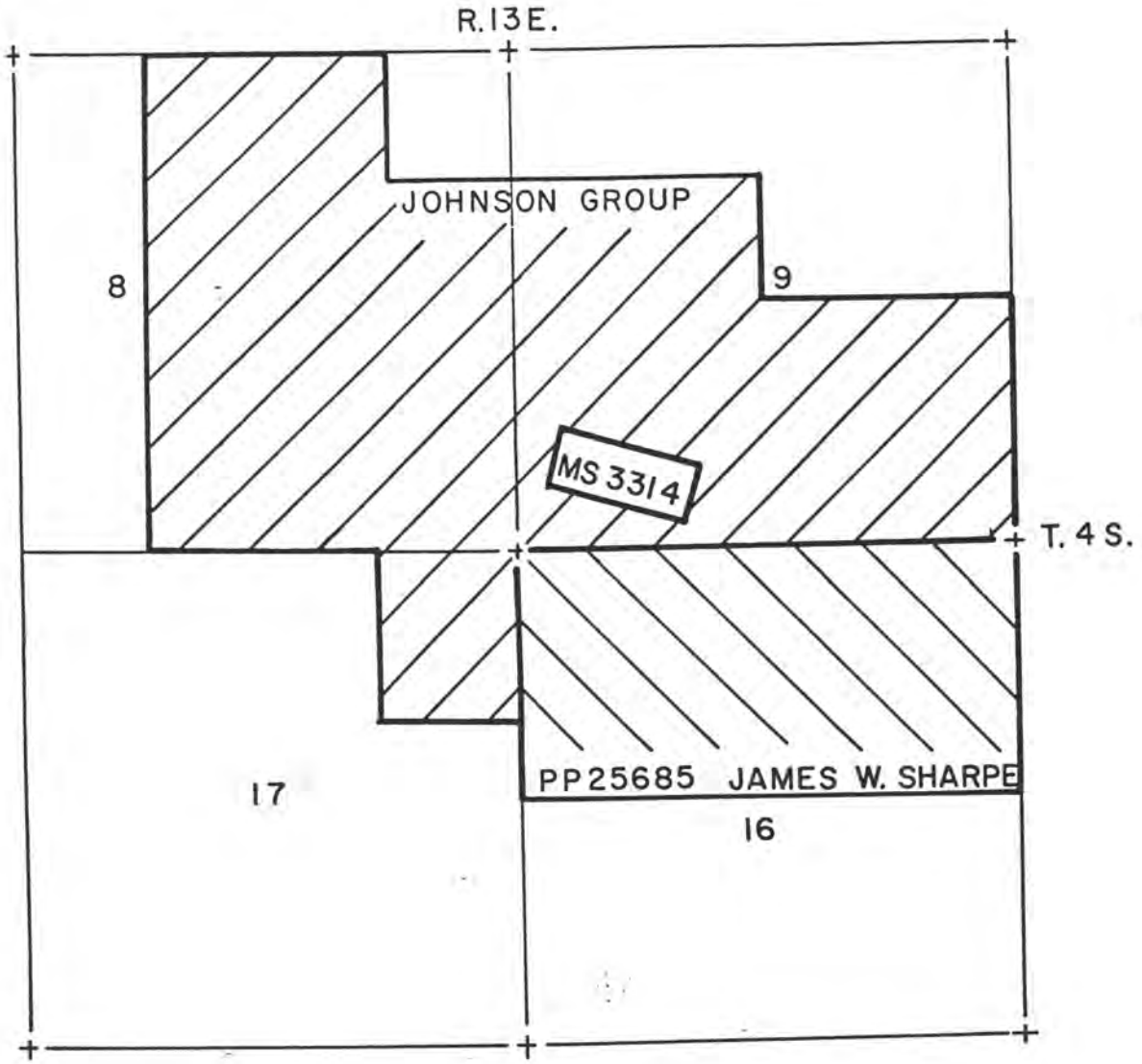

TITLE KELVIN PROSPECT - SUBSURFACE LAND STATUS SKETCH NO. 10

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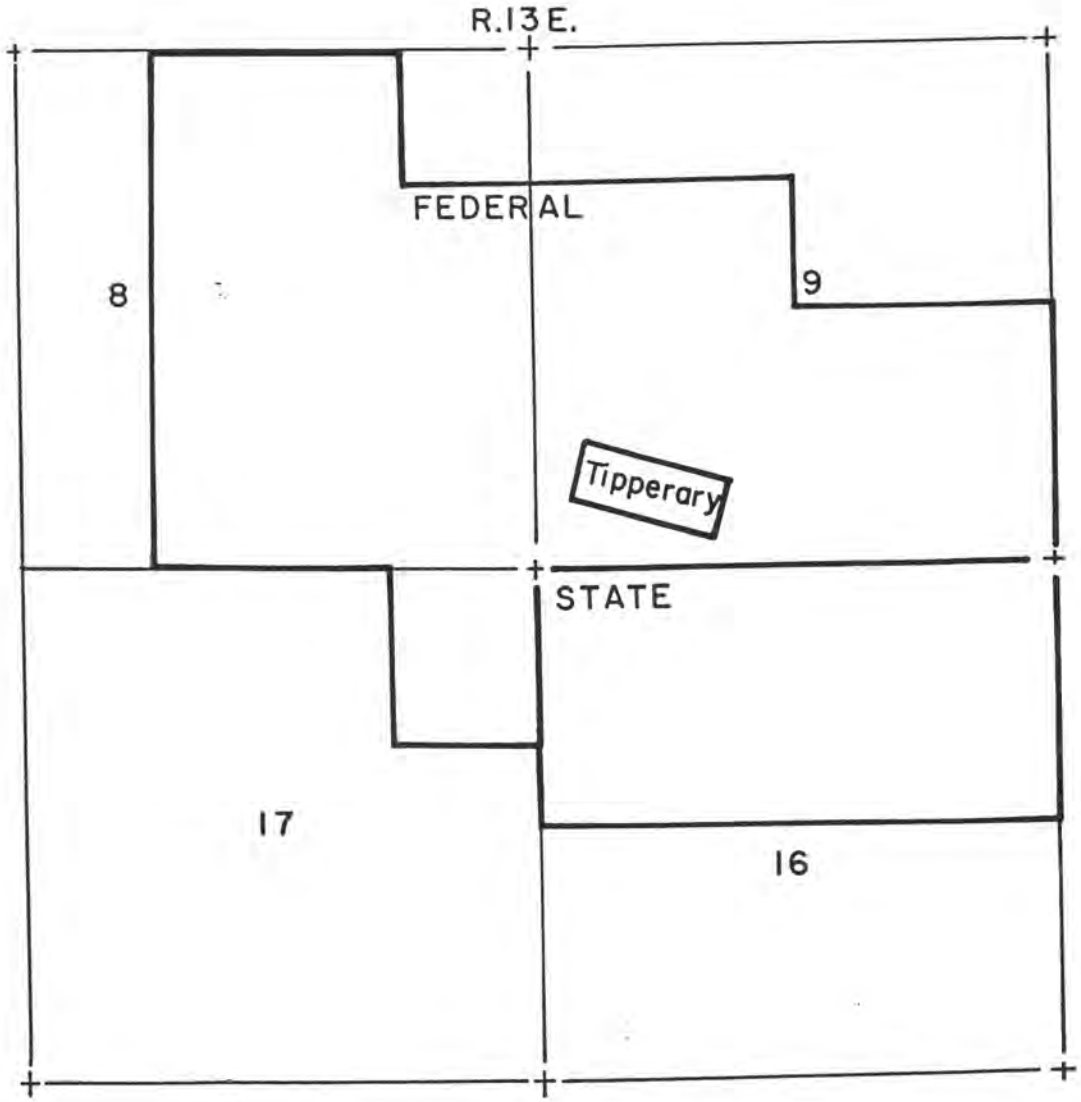

TITLE KELVIN PROSPECT - SURFACE LAND STATUS SKETCH NO. 11

is related to sulfide mineralization there is no assurance that the anomaly is caused by economic amounts of copper sulfides. Many such anomalies are caused by pyrite without associated economic amounts of copper. However, the previous sections have shown that there is a reasonable chance that the anomaly may be related to ore-grade copper mineralization and the only way to test the hypothesis and the anomaly is by drilling.

The second problem that may be encountered concerns the land situation. It is nearly certain that an agreement can be reached between the Johnsons and C.S.M.C. This will give us control of the major portion of the area of interest. As stated under the Land Status section, the other two landowners, Tipperary and Sharpe, have not been contacted and therefore we do not know their terms, if they are willing to option the property. However, we have no reason to believe that agreements cannot be reached with them.

COST ESTIMATES FOR A THREE HOLE DRILLING PROGRAM

DRILLING:*

Mobilization-Demobilization	$ 1,000.00
Drilling between 0 & 500'; 1500' @ $ 7.90/Ft.	11,850.00
Drilling between 500 & 1000'; 1500' @ 8.50/Ft.	12,750.00
Drilling between 1000 & 1500'; 1500' @ 9.20/Ft.	13,800.00
Drilling between 1500 & 2000'; 500' @ 10.20/Ft.	5,100.00
Water truck rental; 4 months @ $325.00/Mo.	1,300.00
Water, mud, additives, casing, down time, standby, etc.	4,300.00
TOTAL DRILLING	$50,100.00

LAND:

Johnson Claim Group - First year option	$ 6,000.00
Tipperary & Sharp Land - First year option	5,000.00
TOTAL LAND	$11,000.00

ROADBUILDING:**

Mobilization-Demobilization	$ 300.00
5250' Roadbuilding ÷ 750'/day=7 days=56 hours D-9 Rental W/operator; 56 hours X $75.00/Hr.	4,200.00
TOTAL ROADBUILDING	$ 4,500.00

SAMPLING:

Assaying - estimate 750 assays including sample preparation: 750 x $3.60/sample	$ 2,700.00
Physical Property tests (1 sample each 50') 5000'÷50'=100 samples x $12.00 (includes sample prep. I.P.& Mag. suscept. determ.)	1,200.00
TOTAL SAMPLING	$ 3,900.00

DOWNHOLE ELECTRICAL SURVEYS:***

10 Days @ _550.00/Day	$ 5,500.00
GRAND TOTAL	$75,000.00

* Estimated from recent bids at Elfrida, Arizona
** Estimated from information supplied by W. Bennett-Pinto Valley
*** Estimated from recent work at Bagdad, Arizona

SUMMARY

The Kelvin Prospect is favorably located regionally with respect to known major copper mineralization. The geology of the prospect area is favorable for porphyry copper type mineralization in that acidic intrusive rocks of Laramide age are present on the property. Similar rocks are known to be genetically related to porphyry copper mineralization in other parts of Arizona. The structural history of the area permits a hypothesis that the property contains a porphyry copper sulfide system that has been rotated easterly $\pm$ 90° and is presently concealed by Precambrian granite. An induced polarization anomaly present on the property is almost certainly related to sulfide mineralization. Neither the most favorable portion of the induced polarization anomaly nor the geologic model has been tested by drilling. The most favorable land can probably be optioned at reasonable terms. It is felt that three drill holes are needed to adequately test the prospect area (see Figure 4). Two holes to a depth of 1500 feet and one to 2000 feet are planned. The drilling will proceed in stages with the location and depths of the latter hole(s) dependant on information gained from the former. It is possible that the prospect can be adequately tested with two holes but this will not be known until after the completion of the first two holes.

If results of this program are encouraging then additional work will be necessary. This request covers only the initial evaluation which it is estimated will take less than one (1) year to complete.

RECOMMENDATION

I recommend that a CE for $75,000 be issued to cover the cost of the first year options on the property and the cost of conducting a three hole drill program.

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PROJECT KELVIN DRILL HOLE NO. J-1 SCALE 1" = 100' PAGE NO. 1 OF 4

LENGTH	Vol. % Sulf. (mm)	ASSAYS (%) Cu.	Mo	S	calc. wt. % sulfide	Py/Cp	Mineralization & Miscellaneous
							35'-40': trace copper oxides (& sulfides) in veinlets.
							trace copper oxides
100	0.39	.0768	.0016	.2600	.560	1.5	.0295 % Zinc
							trace covellite
							169': lost all circulation
200							
300							
400							
500							
600							
700							

Chalcopy | Pyrite | STRUCT. | ROCK

Zone of surface oxidation (0-133')

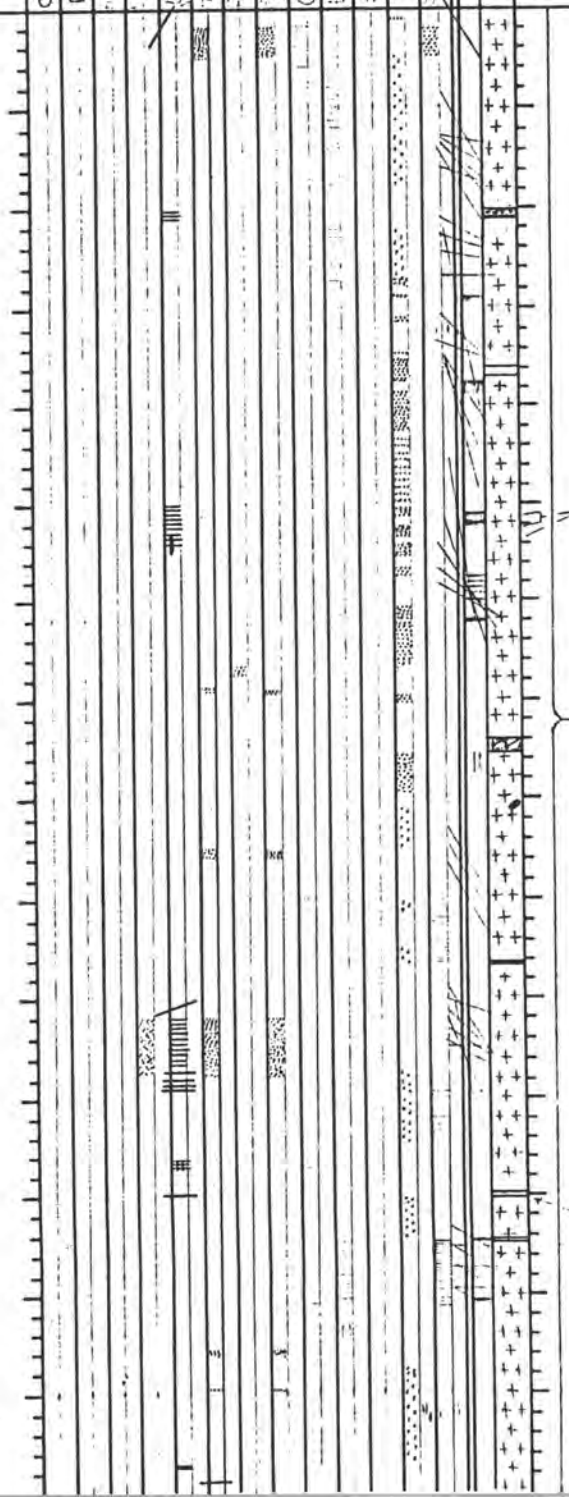
Plagioclase altered to: 20% sericite, 10% secondary K-spar, 5% clay, 1% CO_3, 1% chlorite, 1% epidote and 2% quartz. Primary K-feldspar altered to 2% quartz plus a trace of hematite - the remainder is untwinned and is assumed to be recrystallized to secondary K-feldspar. Mafic [illegible] altered to: 55% chlorite, 4% sericite, 3% rutile & leucoxene, 4% carbonate, 4% epidote & 1% biotite. Probably a "propylitic subzone" of that assemblage described below: possibly separated from the rock below by a fault.

461-471: breccia

0-2478 (unless otherwise noted): Precambrian Oracle Granite: porphyritic quartz monzonite with [illegible] pink, euhedral K-feldspar [illegible] crystals up to 1.5 inch in length [illegible] crystals, generally euhedral up to [illegible] inch in diameter in a course to [illegible] mass of quartz, K-spar, plagioclase, biotite and [illegible] magnetite and [illegible].

PROJECT KELVIN DRILL HOLE NO. J-1 SCALE 1" = 100' PAGE NO. 2 OF 4

LENGTH	Vol % Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	Calc. wt % sulfide	Py/Cp	Mineralization & Miscellaneous
800							
900							
	0.56	.0573	.0010	.2182	.470	1.8	.0047 % Zinc
1000							
1100							
1200							
1300							
1400							
1500							



Summary Lithology

851-856: Precambrian Diabase: approximately 13% phenocrysts (10% plagioclase, 2% quartz and 1% hornblende) in a very fine-grained matrix of quartz, plagioclase and hornblende or actinol[illegible]. The plagioclase is strongly zoned and is strongly altered to sericite along the rims - the cores are some times fresh. Mafic phenocrysts are strongly altered to chlorite + epidote. [illegible] Probably "contaminated" by surrounding [illegible] Oracle Granite.

930-935, 1231-1231½, 1349½-1350½, 1372-1373: Precambrian aplite: 50% quartz, [illegible] plagioclase, 28% K-feldspar and 2[illegible] mafic minerals. Plagioclase altered 45% to sericite, K-feldspar altered 15% to chlorite, mafics altered 70% sericite and 30% to chlorite.

1006-1011: [illegible] zone, also 1017-1019

PROPYLITIC ALTERATION ASSEMBLAGE: Overall plagioclase is altered 30% to sericite, [illegible] 3% to clay, 2% to quartz, 2% to chlorite, 1% to carbonate plus a trace of biotite [illegible] and epidote. Primary K-feldspar is [illegible] sericite, 2% to quartz, 1% to chlorite [illegible] of carbonate, clay, biotite, magnetite [illegible] remainder is not twinned and [illegible] completely recrystallized to secondary K-feldspar. Mafic minerals are altered 40% to chlorite, 10% to sericite, 3% to biotite, 2% to epidote, 2% to rutile &/or leucoxene, 1% to quartz, 1% to magnetite and 1% to carbonate. Copper = .0602%, Molybdenum = .0012%, total sulfides = 0.48 wt. %, pyrite : chalcopyrite = 1.76 : 1.0, Zinc .0077%. Below 1000 feet (+/-) K-spar-chlorite alteration apparently becomes somewhat more intense than in the rock above: plagioclase may be altered up to 20% to secondary K-spar plus 5% chlorite and sericite [illegible] mafic minerals may be [illegible] absent [illegible] lower zone.

1120-1128: Tertiary-Cretaceous Granodiorite Porphyry: Phenocrysts of quartz (rounded up to [illegible] inch) plagioclase (subhedral to euhedral up to 0.1 inch in length) and biotite (subhedral averaging 0.05 in diameter) in a groundmass of quartz, feldspar (K-feldspar ?) chlorite and carbonate. Total phenocrysts approximately 30% - overall rock is medium gray. Possibly same as Teacup Granodiorite described below.

[illegible]

PROJECT KELVIN DRILL HOLE U-1 SCALE 1" = 100' PAGE NO. 3 OF 4

LENGTH	Vol % Fe_3O_4 (mag)	ASSAYS (%) Cu	Mo	S	Sulf. wt % sulfide	Py/Cp
1600						
1700	0.19	.1426	.0018	.2300	.573	0.39
	0.10	.3967	.0066	.7000	1.710	0.49
1800	0.51	.0422	.0016	.3800	.753	5.2
1900	0.42	.5843	.0012	1.165	2.76	0.64
2100	0.32	.0131	.0006	.0533	.113	2.0
2200						

Mineralization & Miscellaneous

speck of native copper associated with mafics

1740-1795 = 55' =
.3927 Copper
.0059 Molybdenum

1795-1930 = 135' =
.0503 Copper
.0016 Molybdenum

1740-2100 = 360' =
.3812 Copper
.0021 Molybdenum

50' = 1.27 % Copper

1930-2100 = 170' =
.6573 Copper
.0012 Molybdenum

ZINC: 1900-2050 =
.0283 %.

1740-2400 = 660' =
.2524 Copper
.0020 Molybdenum

2123-2236 = 113' =
.0024 Copper
.0003 Molybdenum

Pyrite | Chalcopyrite | Bornite | Quartz Veins | Magnetite | Secondary Sericite | Secondary Biotite | Carbonate | Epidote | Green Sericite | Mafic Chlorite | Clay | STRUCT. | ROCK

Rock Description & Comments

1510-1520: Intimate mixture of Precambrian Granite Gneiss and Precambrian Aplite.

1512-1514: "mylonitic"

PHYLLIC ALTERATION ASSEMBLAGE: Overall plagioclase is altered 65% to sericite, 10% to chlorite, 5% to carbonate, 5% to secondary K-spar, 1% to mafics, 1% to biotite, 1% to clay, 1% to quartz plus a tr. of epidote. Primary K-feldspar is altered 10% to sericite, 5% to chlorite, 3% to carbonate, and 2% to quartz - the remainder is not [illegible] assumed to be completely replaced by secondary K-spar. Mafic minerals are altered 45% to chlorite, 20% to sericite, 5% to carbonate, 3% biotite, 3% to rutile-leucoxene and [illegible] carbon plus a trace of epidote and pyrite. Copper = .225, Molybdenum = .0021 %, total sulfides = 1.20 wt. %, pyrite : chalcopyrite = 0.84:1.0, Zinc = .0091%.

1932-1983: Tertiary-Cretaceous Granodiorite Porphyry II (? See description above. Overall rock is dark gray and well mineralized (>1.2% copper). Plagioclase altered 60% to sericite, 20% to chlorite, [illegible] quartz. [illegible] altered 95% to chlorite and [illegible] leucoxene. Matrix K-spar is partially altered to sericite and chlorite. The original rock was [illegible] rich. Exact identity of this unit is tenuous.

2123-2236; 2245-2253: Tertiary Dacite Porphyry: a light gray to cream colored rock with approximately 30% phenocrysts (50% plagioclase, 35% quartz, 10% biotite, hornblende, [illegible] feldspar) in a fine grained groundmass of sericite, quartz, carbonate, chlorite, and possible clay. Phenocrysts (quartz & feldspar) up to [illegible] altered 50% to sericite, 15% carbonate, 15% [illegible] and 5% to chlorite, K-feldspar partially altered to carbonate. Mafic minerals altered 40% to chlorite, 3[illegible] to sericite, 15% to carbonate and 5% to rutile-leucoxene. Matrix strongly altered to sericite, carbonate and chlorite. Probably you [illegible] TKap II above - may be correlative with [illegible] latite porphyry (TPl) of the U.S.G.S. [illegible]

PROJECT KELVIN DRILL HOLE J-1 SCALE 1" = 100' PAGE NO. 4 OF 4

LENGTH	Est. % Sulfide	ASSAYS (%) Cu	Mo	S	calc. wt. % sulfide	Py/cp	Mineralization & Miscellaneous
	0.70	.0719	.0007	.1200	.300	0.43	
2300							
	0.46	.2010	.0044	.3400	.845	0.40	
2400							
	0.40	.1030	.0031	.5328	1.100	2.7	.0047% Zinc 2458-2471: specular hematite veinlets at 40° to core axis.

Chalcopyrite, Pyrite, Molybdenite, Limonite, Quartz veinlets, Magnetite, Secondary Sulfides, Secondary Minerals, Carbonate, Epidote, Hematite, Chlorite, Sericite, STRUCT., ROCK

Summary Lithology

[illegible] Feldspar phenocrysts. Contact @ 2073' = 90°, 2236' = 50°, 2242' = 42°, 2253' = near vertical to axis [illegible] = 42°).

Alteration descriptions above from petrographic examination of 54 thin sections by J. A. Hennessy and D. F. Denison.

Yellow in "white sericite" column = clay (0-130').

2478 feet is total length

* date started: 16 JULY 1974
* date completed: 3 JAN 1975
total length: 2478 Feet
Hole size:
0-11' : 4½ inch (rock bit)
11-2478: NX wireline core
collar location: approximately 50 FNL & 2000 FWL, section 16, T. 4S., R. 13E, Pinal Co., Ariz.
collar elevation: 2450 feet (±)
inclination: −90° (weld survey at 2100 feet = −80°±).

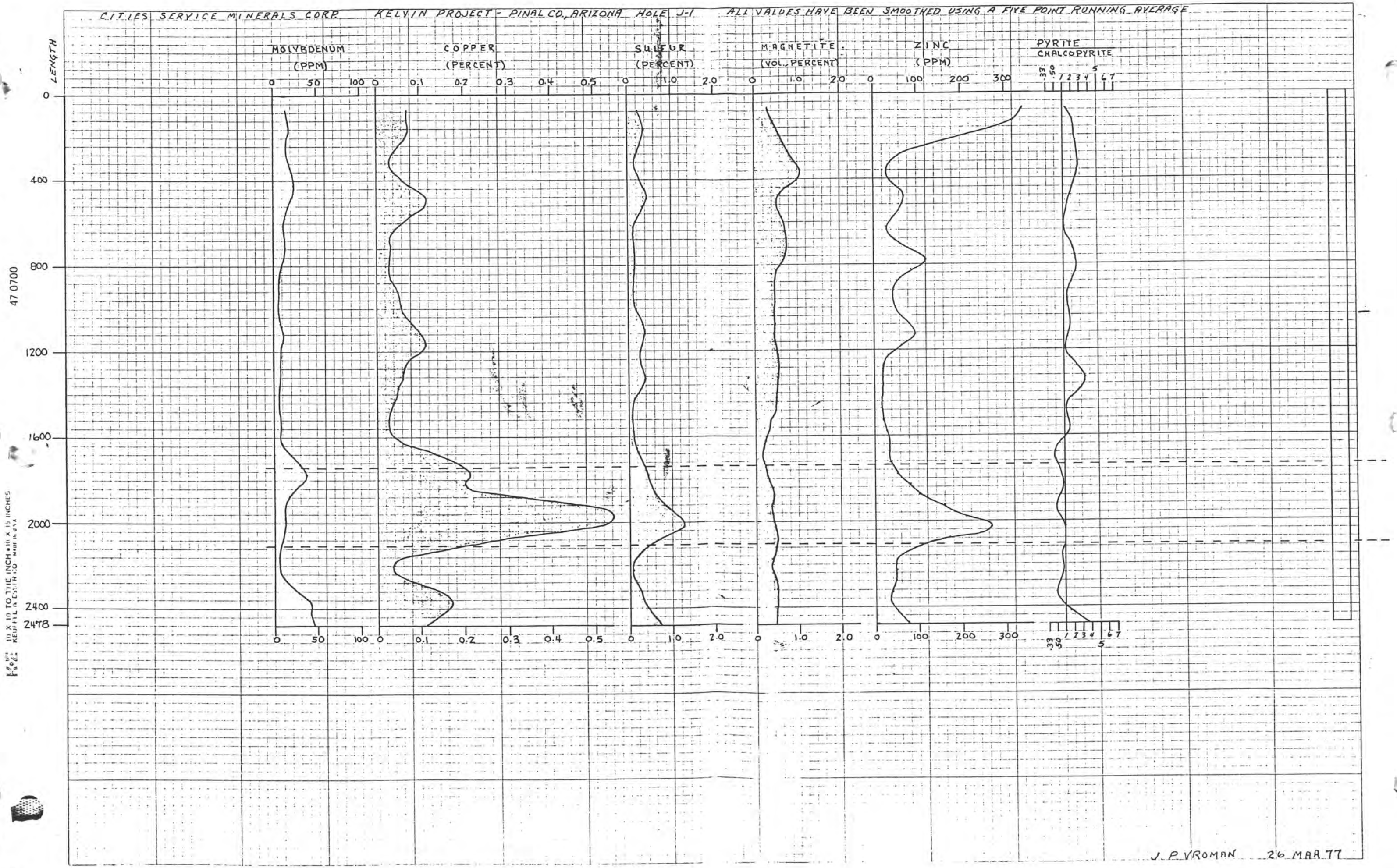
Drilling Contractor: Joy Manufacturing Co.

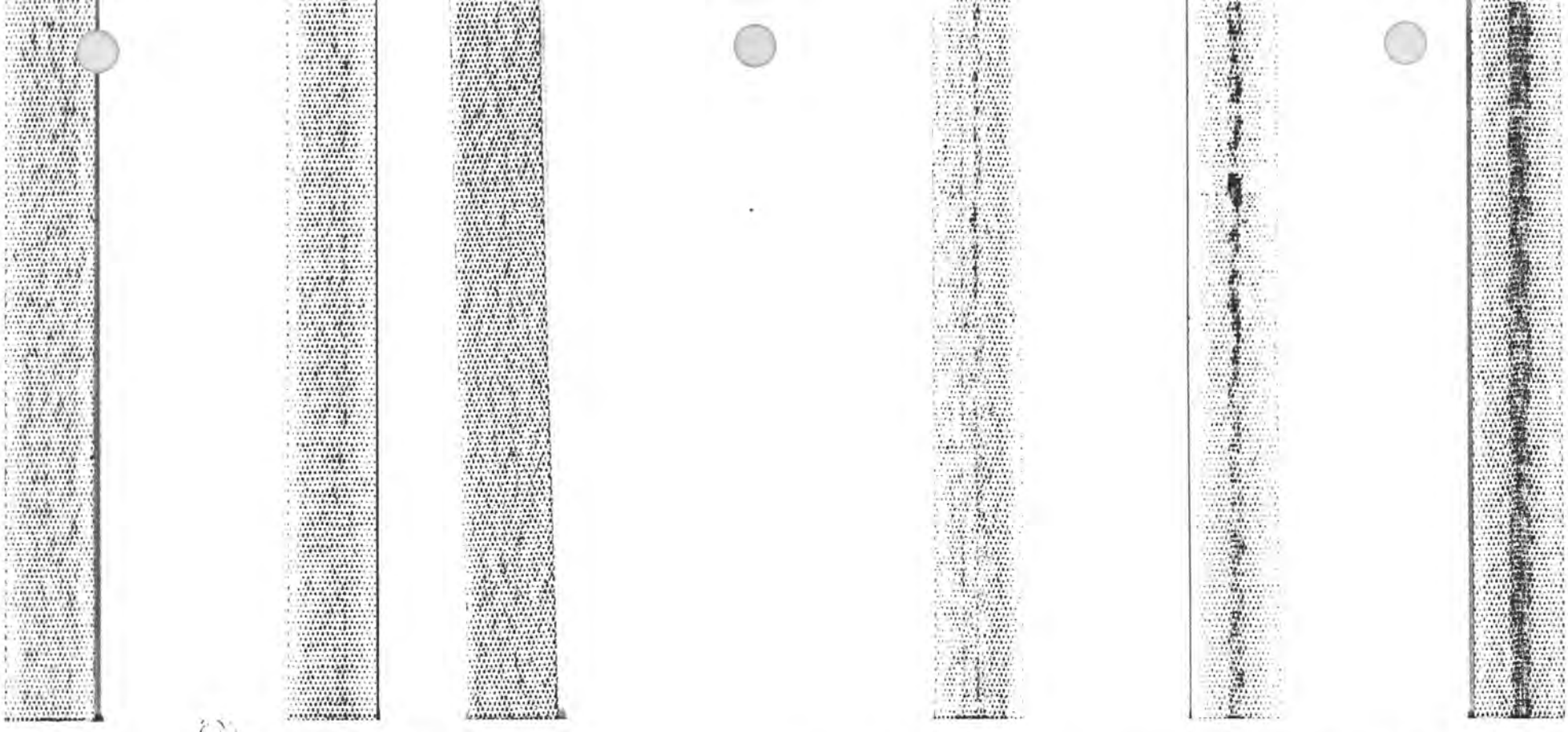
Casing Left in Hole:
0-180 feet = 180' NX
(split at 10' & 25')

Average footage/shift = * 12.8
Direct drilling cost: $ 9.61/ft
Mud, additives, water: 1.48/ft
cementing, reaming, casing: 1.01/ft
assaying: .73/ft
casing left in hole: .33/ft
Thin sections .08/ft
TOTAL $ 13.24/ft

* rig was shut down at 1378' on 8/28/74 and moved to hole J-2 - hole was re-entered at 1378' on 11/3/74

Logged By:
0-1378: R. Sawyer & R. Moore
1378-2478: R. Sawyer & J. Vroman
logging was not done graphically - this log is reconstructed from the original "verbal type" log.

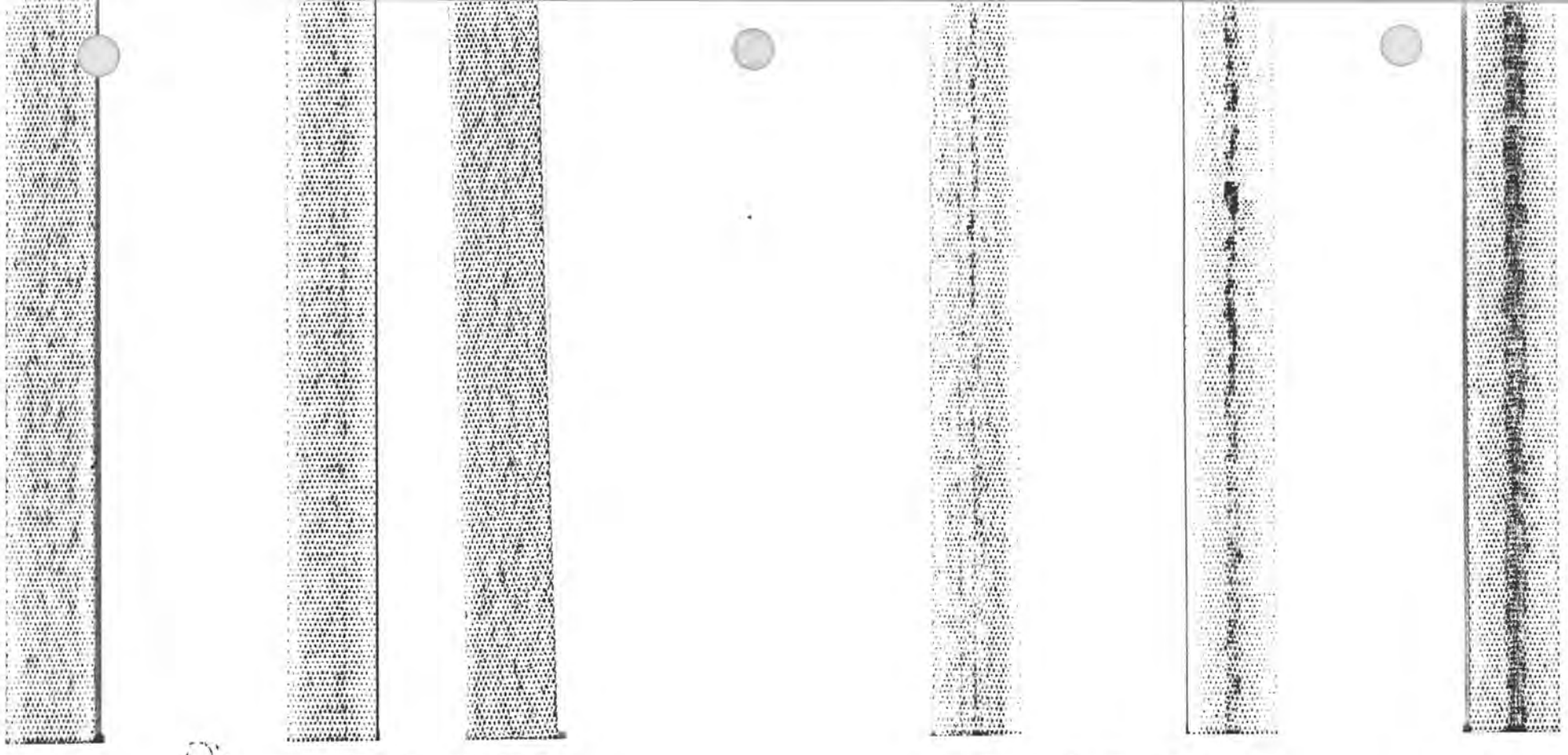

CITIES SERVICE MINERALS CORP. KELVIN PROJECT - PINAL CO., ARIZONA HOLE J-1
ALL VALUES HAVE BEEN SMOOTHED USING A FIVE POINT RUNNING AVERAGE
LENGTH
MOLYBDENUM (PPM)
COPPER (PERCENT)
SULFUR (PERCENT)
MAGNETITE (VOL. PERCENT)
ZINC (PPM)
PYRITE
CHALCOPYRITE
0
400
800
1200
1600
2000
2400
2478
47 0700
J. P. VROMAN 26 MAR 77



AMPAD EFFICIENCY LINE NO. 6636

C.S.M.C. KELVIN PROJECT: HOLE J-
REPLICATE ASSAYS ON PULPS
(originally prepared by R.M.G.C.)

INTERVAL	1 RMG.C. (% COPPER)	2 Skyline	3 Am. Anal.	4	5	6	7 R.M.G.C. (PPM MOLYBDENUM)	8 Skyline	9 Am. Anal.	10	11	12	13
[illegible] 1	.04	.	.										
[illegible] 2	.04	.	.										
[illegible] 3	.03	.	.										
[illegible] 4	.10	.	.										
[illegible] 5	.23	.	.										
[illegible] 6	4.60	.	.										
[illegible] 7	2.30	.	.										
[illegible] 8	1.20	.	.										
[illegible] 9	.70	.	.				11						
[illegible] 10	.35	.	.										
[illegible] 11	.36	.	.										
[illegible] 12	.66	.	.										
[illegible] 13	.43	.	.										
[illegible] 14	.70	.	.										
[illegible] 15	1.40	.	.										
[illegible] 16	.46	.	.										
[illegible] 17	.50	.	.										
[illegible] 18	.13	.	.										
[illegible] 19	.07	.	.				13						
[illegible] 20	.18	.	.										
[illegible] 21	.22	.	.										
[illegible] 22	.15	.	.										
[illegible] 23	.54	.	.										
[illegible] 24	.41	.	.										
[illegible] 25	.72	.	.										
[illegible] 26	1.60	.	.										
[illegible] 27	.39	.	.										
[illegible] 28	.40	.	.										
[illegible] 29	.50	.	.				14						
[illegible] 30	.33	.	.										
[illegible] 31	.47	.	.										
2060 - 2065	.42	.	.										
2065 - 2070	.22	.	.										
2070 - 2075	.13	.	.										
[illegible] 1	.25	.	.										
[illegible] 2	.07	.	.										
2085 - 2090 3	.28	.	.										
[illegible] 4	.49	.	.										
2095 - 2100 5	.70	.	.				11						
6													
MEAN 7													
[illegible] - 2035 8	.8429	.	.				13.0	.	.				
[illegible] - 2100 9	.6574	.	.				12.5	.	.				
10													
11													
12													
13													
14													
15													
16													
17													
18													



AMPAD EFFICIENCY LINE NO. 6636

HOLE J-1 - Replicate Assays on pul (prepared by R.M.G.C.)

INTERVAL	1 Am. Anal.	2 Skyline	3 R.M.G.C.	4	5	6 MEAN	7 Am. Anal	8 Skyline	9 R.M.G.C.	10	11	12	13 MEAN
1905-1910 1	.05	.04	.04			.04	13	6	4				
1910-1915 2	.05	.04	.04			.04	8	4					
1915-1920 3	.03	.02	.03			.03	21	12					
1920-1925 4	.11	.11	.10			.11	18	14					
1925-1930 5	.21	.20	.23			.21	18	6					
1930-1935 6	3.68	3.84	4.60			4.04	7	4					
1935-1940 7	2.20	2.23	2.30			2.24	14	6					
1940-1945 8	.88	1.09	1.20			1.06	11	4					
1945-1950 9	.72	.78	.70			.73	12	8	11				
1950-1955 10	.37	.36	.35			.36	15	10	4				
1955-1960 11	.34	.34	.36			.35	14	8					
1960-1965 12	.65	.67	.66			.66	17	8					
1965-1970 13	.39	.41	.43			.41	24	14					
1970-1975 14	.65	.73	.70			.69	16	8					
1975-1980 15	1.46	1.45	1.40			1.44	13	4					
1980-1985 16	.43	.41	.46			.43	18	14					
1985-1990 17	.47	.47	.50			.48	15	8					
1990-1995 18	.13	.13	.13			.13	6	2					
1995-2000 19	.14	.09	.09			.11	17	4	13				
2000-2005 20	.19	.20	.18			.19	15	18					
2005-2010 21	.21	.20	.22			.21	20	16					
2010-2015 22	.50	.47	.50			.49	14	6					
2015-2020 23	.49	.48	.54			.50	19	10					
2020-2025 24	.40	.36	.41			.39	33	16					
2025-2030 25	.60	.64	.72			.65	22	10					
2030-2035 26	1.18	1.25	1.60			1.34	45	50					
2035-2040 27	.34	.34	.39			.36	11	4					
2040-2045 28	.37	.35	.40			.37	10	2					
2045-2050 29	.46	.46	.50			.47	19	2	14				
2050-2055 30	.31	.31	.33			.32	9	6	4				
2055-2060 31	.43	.49	.47			.46	10	4					
2060-2065	.28	.30	.42			.33	12	6					
2065-2070	.19	.20	.22			.20	6	4					
2070-2075	.09	.12	.13			.11	11	2					
2075-2080 1	.23	.23	.25			.24	7	2					
2080-2085 2	.07	.06	.07			.07	6	2					
2085-2090 3	.23	.24	.28			.25	15	4					
2090-2095 4	.48	.49	.49			.49	38	26					
2095-2100 5	.64	.69	.70			.68	28	24	11				
6													
7	(-5.0%)	(-1.8%)	(+6.8%)										
1930-2100 8	.5941	.6141	.6676	11%		.6253	16	9	12				12
9													
1930-1980 10	1.134	1.190	1.270	11%		1.198							
11													
1930-2060 12	.6919	.7135	.7746	11%		.7267							
13													
14	-5	-0	-6										
(J1, J4, J5) 15													
TOTAL (-) 16	13/85	3/85	11/85					1					

AMPAD EFFICIENCY LINE NO. 6636

HOLE J-1 CORRELATION

COMPOSITED ASSAY DATA

	1 Am. Anal	2 Skyline	3 R.M.G.C.	4	5 MEAN	6	7	8 Am. Anal	9 Skyline	10 R.M.G.C.	11	12	13
10-1920	.04	.03	.04		.04								
1920-1930	.16	.16	.16		.16		1920-40	1.55	1.60	1.81			
30-1940 3	2.94	3.04	3.45		3.14		1940-60	.58	.64	.65			
1940-1950 4	.80	.94	.95		.90		1960-80	.78	.82	.80			
1950-1960 5	.36	.35	.36		.36		1980-2000	.29	.28	.30			
1960-1970 6	.52	.54	.54		.53		2000-20	.35	.34	.36			
1970-1980 7	1.06	1.09	1.05		1.07		2020-40	.63	.65	.78			
1980-1990 8	.45	.44	.48		.46		2040-60	.39	.40	.42			
1990-2000 9	.14	.11	.11		.12		2060-80	.20	.21	.26			
2000-2010 10	.20	.20	.20		.20		2080-2100	.36	.37	.38			
2010-2020 11	.50	.48	.52		.50								
2020-2030 12	.50	.50	.56		.52								
2030-2040 13	.76	.80	1.00		.85		1900-1940	.90	.93	1.05			
2040-2050 14	.42	.40	.45		.42		1940-1980	.68	.73	.72			
2050-2060 15	.37	.40	.40		.39		1980-2020	.32	.31	.33			
2060-2070 16	.24	.25	.32		.27		2020-2060	.51	.52	.60			
2070-2080 17	.16	.18	.19		.18		2060-2100	.28	.29	.32			
2080-2090 18	.15	.15	.18		.16								
2090-2100 19	.56	.59	.60		.58								
20													
30-2100 21	.594	.614	.668		.625								
22													
23	-5.0%	-1.8%	+6.9%		—								
24													
25													
26													
27													
28													
29													
30													
31													

EFFICIENCY LINE NO. 6636

	1 % Cu	2 wt. % Cp	3 % S in Cp	4 % S	5 % S in py	6 wt. % py	7	8 [illegible]	9 % Mo	10 Pg/Cp	11 % Zn	12 % Fe_3O_4	13
	ASSAY	Cu × 2.5885 =	Cu × 1.00925 =	ASSAY	Column 4 minus column 3 =	% S in py × 1.571 =							
[illegible] 1	.083	.2397	.0838	.05	—	—		0.24	.0014	—	.0332	.142	
[illegible] 2	.047	.1358	.0474	.43	.3826	0.716		0.65	.0011	5.3	[illegible]	.557	
[illegible] 3	.115	.3322	.1161	.12	.3039	0.569		0.90	.0029	1.7	[illegible]	.388	
[illegible] 4	.056	.1618	.0565	.35	.2935	0.549		0.71	.0012	3.4	[illegible]	.715	
[illegible] 5	.030	.0867	.0303	.14	.1097	0.205		0.29	.0005	2.4	.0071	.808	
[illegible] 6	.026	.0751	.0262	.11	.0858	0.157		0.23	[illegible]	2.1	.0032	.660	
[illegible] 7	.028	.0809	.0283	.21	.1817	0.340		0.42	[illegible]	4.2	.0026	1.702	
[illegible] 8	.055	.1589	.0555	.22	.1645	0.308		0.47	[illegible]	1.9	.0020	.772	
[illegible] 9	.166	.4795	.1675	.70	.5325	0.996		1.48	[illegible]	2.1	.0113	.218	
[illegible] 10	.139	.4015	.1403	.39	.2497	0.467		0.87	[illegible]	1.2	.0075	.425	
[illegible] 11	.064	.1849	.0646	.10	.0354	0.066		0.25	[illegible]	0.36	.0028	.877	
[illegible] 12	.027	.0780	.0272	.10	.0728	0.136		0.21	[illegible]	1.7	.0023	.657	
[illegible] 13	.030	.0867	.0303	[illegible]	.0497	0.093		0.18	[illegible]	1.1	.0022	.628	
[illegible] 14	.045	.1300	.0454	.20	.1546	0.289		0.42	[illegible]	2.2	.0034	.868	
[illegible] 15	.040	.1155	.0404	.20	.1596	0.299		0.41	[illegible]	2.6	.0274	.770	
[illegible] 16	.025	.0722	.0252	.13	.1048	0.196		0.27	[illegible]	2.7	.0025	.136	
[illegible] 17	.016	.0462	.0161	.11	.0939	0.176		0.22	[illegible]	3.8	.0026	.658	
[illegible] 18	.073	.2109	.0737	.21	.1363	0.255		0.47	[illegible]	1.2	.0050	.274	
[illegible] 19	.060	.1733	.0606	.16	.0994	0.186		0.36	[illegible]	1.1	.0063	.585	
[illegible] 20	.042	.1213	.0423	.13	.0876	0.164		0.29	.0001	1.4	[illegible]	.418	
[illegible] 21	.062	.1791	.0626	.35	.2874	0.538		0.72	[illegible]	3.0	.0051	.565	
[illegible] 22	.135	.3899	.1362	.49	.3538	0.662		1.05	[illegible]	1.7	.0200	.152	
[illegible] 23	.144	.4159	.1453	.31	.1647	0.308		0.72	.0001	0.74	.0018	.700	
[illegible] 24	.053	.1531	.0535	.15	.0965	0.181		0.33	[illegible]	1.2	.0019	.348	
[illegible] 25	.052	.1502	.0525	.18	.1275	0.239		0.39	[illegible]	1.6	[illegible]	.867	
[illegible] 26	.087	.2513	.0878	.73	.6422	1.202		1.45	.0010	4.8	.0023	.308	
[illegible] 27	.032	.0924	.0323	.25	.2177	0.407		0.50	.0007	4.4	.0018	.536	
[illegible] 28	.062	.1791	.0626	.06	—	—		0.18	.0007	—	.0017	.450	
[illegible] 29	[illegible]	.0809	.0283	.08	.0517	[illegible]		0.18	[illegible]	1.2	[illegible]	.625	
[illegible] 30	.028	.0809	[illegible]	[illegible]	.0517	[illegible]		[illegible]	[illegible]	1.2	.0016	.153	
[illegible] 31	[illegible]	[illegible]	[illegible]	.16	.1397	.262		[illegible]	.0010	4.5	[illegible]	.498	

EFFICIENCY, LINE NO. 6636

	1 % Cu	2 wt. % Cp	3 % S in Cp	4 % S	5 % S in py	6 wt % py	7	8 TOTAL	9 % Mo	10 py/cp	11 % Zn	12 % Fe_3O_4	13
	assay	Cu × 2.8955 =	Cu × 1.00925 =	assay	column 4 minus column 5 =	% S in py × 1.871		wt % py + wt % cp = total %					
-1650 1	.075	.1011	.0353	.08	.0447	0.084		0.18	.0007	0.83	.0064	.092	
1650 2	.1214	.3507	.1225	.14	.0175	0.032		0.38	[illegible]	0.09	.0020	.142	
-1750 3	.1638	.4731	.1653	.32	.1546	0.289		0.76	[illegible]	0.61	.0023	.245	
[illegible] 4	.3967	1.1459	.4004	.70	.2996	0.561		1.71	.0066	0.49	.0045	.095	
-1850 5	.0405	.1167	.0408	.26	.2192	0.410		0.52	.0020	3.31	.0101	.515	
[illegible] 6	.0439	.1268	.0443	.50	.4557	0.852		0.98	.0011	6.72	.0058	.504	
1900 [illegible] 7	.9231	2.6808	.9367	1.14	.2033	0.380		3.06	.0011	0.14	[illegible]	.163	
[illegible] 8	.5082	1.4679	.5129	.74	.2271	0.425		1.89	[illegible]	0.29	.0032	.606	
[illegible] 9	.5110	1.4760	.5157	2.22	1.7043	3.189		4.66	[illegible]	2.16	[illegible]	.151	
-2100 10	.3900	1.1265	.3936	.56	.1664	0.311		1.44	.0011	0.28	.0043	.745	
[illegible] 11	.0221	.0638	.0223	.04	.0177	0.033		0.10	.0007	0.52	.0042	.469	
[illegible] 12	.0028	.0081	.0028	.06	.0572	0.107		0.12	.0007	13.21	.0055	.231	
[illegible] 13	.0144	.0416	.0145	.06	.0455	0.085		0.13	[illegible]	2.04	.0059	.267	
[illegible] 14	.0719	.2077	.0726	.12	.0474	0.089		0.30	.0007	0.13	[illegible]	.695	
[illegible] 15	.1900	.5488	.1918	.36	.1682	0.315		0.96	.0011	0.57	.0048	.358	
[illegible] 16	.2280	.6586	.2301	.32	.0899	0.168		0.93	.0078	[illegible]	.0021	.568	
[illegible] 17	.1124	.3247	.1134	.26	.1466	0.274		0.60	.0018	0.84	.0024	.395	
[illegible] 18	.0863	.2493	.0871	1.02	.9329	1.745		1.99	.0054	7.00	.0121	.401	
19													
20											vol % [illegible]		
21													
22													
23							% Mo	TOTAL	% Zn	py/cp	vol % Cp	vol % py	vol % [illegible]
0-1650 24	.0602	.1740	.0608	.2245	.1637	0.306	.0012	0.48	.0074	1.76	.111	.165	0.2[illegible]
1650-2418 25	.2254	.6510	.2275	.5188	.2913	0.545	.0021	1.20	[illegible]	0.84 (1.19)	.417	.294	0.7[illegible]
15-250 26	.0768	.2218	.0775	.2600	.1825	0.341	.0016	0.56	.0295	1.54	.142	.184	0.3[illegible]
250-1650 27	.0573	.1655	.0578	.2182	.1604	0.300	.0010	0.47	.0047	1.81	0.106	0.162	0.2[illegible]
1650-1900 28	.1533	.4427	.1547	.3840	.2293	.429	.0027	0.87	.0049	0.97	0.285	[illegible]	0.5[illegible]
1900-2100 29	.5843	1.6880	.5897	1.1650	.5753	1.076	.0012	2.76	[illegible]	0.63	1.080	0.531	1.66
2100-2250 30	.0131	.0378	.0132	.0533	.0401	.075	.0006	0.11	.0052	1.98	0.024	0.040	0.0[illegible]
2250-2418 31	.1377	.3978	.1390	.4160	.2770	.518	.0034	0.92	.0052	1.30	0.255	0.280	0.53

AMPAD EFFICIENCY. LINE NO. 6636

C S M C. KELVIN PROJECT . HOLE [illegible]

FIVE POINT RUNNING AVERAGES

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5	6 wt % py (weight %)	7 py/cp	8 py+cp	9	10 vol. % cp	11 vol % py	12 vol % lig	13 Mc
										Cu x 1.8363	wt. py x .532		
50-100 1	.0746	.0015	.0345	.2178		.2666	1.2			.1370	.1418	.308	8.8
100-150 2	.0738	.0016	.0323	.3258		.4702	2.2			.1355	.2501	.424	12.1
150-200 3	.0767	.0018	.0248	.3562		.5216	2.4			.1408	.2775	.516	14.0
200-250 4	.0606	.0015	.0160	.2977		.4425	2.5			.1113	.2354	.645	14.9
250-300 5	.0415	.0015	.0077	.2085		.3117	2.6			.0762	.1658	.789	15.5
300-350 6	.0319	.0019	.0039	.1669		.2520	2.7			.0586	.1341	.947	17.1
350-400 7	.0445	.0022	.0032	.2215		.3304	2.6			.0817	.1758	1.064	19.8
400-450 8	.0786	.0022	.0048	.3331		.4748	2.1			.1443	.2526	.823	18.3
450-500 9	.1157	.0022	.0070	.4338		.5931	1.8			.2125	.3155	.558	16.3
500-550 10	.1128	.0017	.0065	.3592		.4590	1.4			.2071	.2442	.526	14.7
550-600 11	.0780	.0014	.0044	.2115		.2484	1.1			.1432	.1321	.652	13.9
600-650 12	.0462	.0011	.0028	.1254		.1474	1.1			.0848	.0784	.699	12.9
650-700 13	.0362	.0013	.0043	.1231		.1620	1.5			.0664	.0862	.720	13.1
700-750 14	.0375	.0013	.0081	.1592		.2271	2.1			.0689	.1208	.717	13.6
750-800 15	.0351	.0012	.0120	.1677		.2475	2.4			.0645	.1317	.627	12.3
800-850 16	.0316	.0009	.0084	.1531		.2268	2.5			.0580	.1207	.470	9.7
850-900 17	.0365	.0008	.0053	.1485		.2089	2.0			.0670	.1111	.452	9.5
900-950 18	.0508	.0007	.0043	.1631		.2092	1.4			.0933	.1113	.435	9.6
950-1000 19	.0556	.0006	.0047	.1754		.2232	1.4			.1021	.1187	.479	10.5
1000-1050 20	.0603	.0006	.0055	.2215		.3006	1.7			.1107	.1599	.459	10.9
1050-1100 21	.0804	.0008	.0078	.3062		.4211	1.8			.1476	.2240	.448	12.3
1100-1150 22	.1068	.0011	.0096	.3623		.4762	1.5			.1961	.2533	.409	12.9
1150-1200 23	.1132	.0009	.0063	.3077		.3620	1.1			.2079	.1926	.495	13.4
1200-1250 24	.0827	.0009	.0033	.2646		.3389	1.4			.1519	.1803	.531	12.9
1250-1300 25	.0658	.0008	.0020	.3154		.4659	2.5			.1208	.2479	.580	14.2
1300-1350 26	.0617	.0008	.0020	.3962		.6248	3.5			.1133	.3324	.504	14.2
1350-1400 27	.0528	.0007	.0019	.2985		.4588	3.0			.0970	.2441	.496	12.6
1400-1450 28	.0465	.0007	.0018	.1615		.2144	1.6			.0854	.1141	.476	10.1
1450-1500 29	.0355	.0007	.0017	.0946		.1100	1.1			.0652	.0585	.459	8.7
1500-1550 30	.0293	.0008	.0020	.0969		.1260	1.5			.0538	.0670	.360	7.2
1550-1600 31	.0337	.0008	.0027	.1154		.1523	1.6			.0619	.0810	.307	6.7

AMPAD EFFICIENCY LINE NO. 6636

weight %

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5	6 wt % py	7 py/cp	8 py+cp	9	10 vol % cp	11 vol % py	12 vol % Mg	13 Mc
										Cu x 1.8363	wt py x .532		
1600-1650 1	.0608	.0009	.0036	.1308		.1299	0.74 1.4			.1116	.0691	.214	5.9
1650-1700 2	.1246	.0017	.0032	.2123		.1619	0.45 2.2			.2288	.0861	.178	7.4
1700-1750 3	.1883	.0029	.0037	.3431		.2864	0.53 1.9			.3458	.1524	.196	10.4
1750-1800 4	.2125	.0037	.0052	.4523		.4450	0.72 1.4			.3902	.2367	.262	13.3
1800-1850 5	.2012	.0028	.0081	.4892		.5354	0.92 1.1			.3695	.2848	.368	15.3
1850-1900 6	.3103	.0017	.0103	.6262		.5857	0.65 1.5			.5698	.3116	.404	19.3
1900-1950 7	.5273	.0012	.0160	.9154		.7170	0.47 2.1			.9683	.3814	.370	25.8
1950-2000 8	.5611	.0012	.0208	1.1415		1.0762	0.57 1.7			1.0303	.5725	.402	30.1
2000-2050 9	.4769	.0012	.0266	1.2446		1.4280	1.04			.8757	.7597	.418	30.8
2050-2100 10	.3123	.0010	.0170	.7985		.9043	1.00			.5735	.4811	.494	23.2
2100-2150 11	.1395	.0008	.0089	.3338		.3611	0.90 1.1			.2562	.1921	.438	13.3
2150-2200 12	.0450	.0006	.0051	.0985		.0993	0.76 1.3			.0826	.0528	.369	7.6
2200-2250 13	.0391	.0006	.0052	.0954		.1047	0.93 1.1			.0718	.0557	.380	7.6
2250-2300 14	.0926	.0013	.0047	.1723		.1475	0.55 1.8			.1700	.0785	.473	10.8
2300-2350 15	.1521	.0026	.0040	.2646		.2079	0.47 2.1			.2793	.1106	.480	13.0
2350-2400 16	.1696	.0041	.0037	.3538		.3417	0.70 1.4			.3114	.1818	.477	14.6
2400-2450 17	.1412	.0041	.0050	.4733		.6214	1.5			.2593	.3306	.437	15.4
2450-2478 18	.1108	.0045	.0078	.6889		1.0796	3.4			.2035	.5743	.418	17.9
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
31													

0-1650 = 12.5
1650-2478 = 16.2

AMPAD EFFICIENCY LINE NO. 6636

THIN SECTION SUMMARY HOLE J-1

		PLAGIOCLASE									K-SPAR						MAFICS										
DEPTH	ROCK	ser	qtz	clay	CO_3	K-spar	biot	chl.	epi	mag	ser	qtz	sec. K-sp.	chl.	hem	other	ser	chl	biot	fol-euc	epi	BO_3	qtz	tr.	py		
65	Yr 1	15	5	10		10							100					65		8							
132	Yr 2	12				2			3			5	100				2	70	10		5						
195	Yr 3	18				10			6			5	100		T			48		10	5						
253	Yr 4	20			10	25			—			10	100				25	50		10		15					
274	Yr 5	11				5							100		T			46			11						An 9
301	Yr 6	30				8							100					42			8						
338	Yr 7			40									100					42			5						
395	Yr 8	40	12			8	2	5					100				5	70		5		10					
440	Yr 9	30				20		5					100					75				10					
464	Yr 10	90						Tr			?	?		?			—	—					—				
500	Yr 11	90	10								75	20					100										
550	Yr 12	25				8							100				12	70		8							
600	Yr 13	18						T	2	*								12									
697	Yr 14	40											100?					42			10						
742	Yr 15	90						5			18	12		5	10	T mg 2 py	90										
785	Yr 16	15				12							100?		T			8									
841	Yr 17	30				20							100				8	62		5		2					
853	Ydb 18	55			8													40			20		8				
904	Yr 19	5											100					12									
*934	Ya 20	95											?	15			70	30									
987	Yr 21	5											100					5									
1036	Yr 22			30		12							100					52			T						
1084	Yr 23	18				8							100					48			6						
1116	Yr 24	50				35		10		15	5			5				65	T								
1123	25	20				T												70									
1166	Yr 26	8		5									100					18									
1176	Yr 27	65					5	10			65			10		5 biot											
1233	Ya 28	25				28							100					50	T		T						
1265	Yr 29	65	20			10		10					100					15	35	15							
1314	Yr 30	10				50		15				10	100	5				90									
1370	Yr 31	15		10		10	1						100					32	12		11						
1430	Yr					50		T	T	T*		5	100	5													
1495	Yr	55	10					8		*			100	2				40	50		5						
1540	Yr 1	20		?	T	25							100					60									
1592	Yr 2	5				30						5	100			2 chl 2 CO_3		55						27	20		
1640	Yr 3	75					10	10		8		5		10					55						15		
1691	Yr 4	75						8		2		2	100	2			20	65			5				10		
1732	Yr 5	78						8		2	8	2		5			70	15	3						20		
1759	Yr 6	95									80	5		5		5 CO_3	—					—	—				
1830	Yr 7	85	2		2	5		5			T	4		5				80		5					5	T	
1872	Yr 8	20			5	5							100	3				42									
1881	Yr 9	65		20	8	8		5		2	10			10				60		10					30		
1931	Yr 10	85						12			5		100	5			25	60		10					10		
1943	11	50						30										90		8							
1973	12	70	2		3			12										?									
2039	Yr 13	95	3					2			80	10		10													
2119	Yr 14	25				15		25		8	2		100	2			30	50							10		
2125	15	60			30	5											50	40									
2200	16	35				25		2									10	40		10		30					
2315	Yr 17	90			5			2						5		5 CO_3	40	50		T					10		
2352	Yr 18	10				5			5								—	—			—						
2402	Yr 19	90						2			2	2		2		10 CO_3	30	60		3					3	3	
2461	Yr 20	95	5					2						30		35 CO_3	—	—		—					—	—	
2476	Yr 21	45			15								100				30	60				10					
	22																										

PROJECT KELVIN DRILL HOLE NO. J-2 SCALE 1" = 100' PAGE NO. 1 OF 5

LENGTH	% Fe_3O_4 (comp.)	ASSAYS % Cu	Mo	S	Weight % sulfide	Py/cp
	0.69	.0020	.0002	.1000	.189	31.6
100	0.57	.0070	.0003	.0200	.044	1.2
	0.76	.0018	.0003	.0400	.076	13.7
200	0.29	.0184	.0007	.8800	1.665	30.4
	0.01	.0207	.0003	.8400	1.593	25.6
300	0.42	.0034	.0002	.0600	.116	10.8
	0.41	.0018	.0002	.1200	.226	42.5
400	0.65	.0014	<.0001	.0300	.058	13.5
	0.55	.0018	<.0001	.0200	.039	6.5
500	0.27	.0030	<.0001	.0200	.041	3.7
	0.59	.0026	.0002	.0400	.078	9.3
600	0.05	.0026	.0005	.0200	.040	4.4
	—	.0021	.0005	.0200	.039	5.4
700	1.13	.0036	.0003	.0300	.059	4.7

Miscellaneous

$CuFeS_2$ | pyrite | quartz in vns & vnlts | Fe_3O_4 | Limonite | MoS_2 | secondary biotite | secondary K-spar | $CaCO_3$ | Epidote | green sericite | white sericite | chlorite + sericite | STRUCT. | ROCK

Summary Lithology & Alteration Log

0-2810: Precambrian Oracle Granite: porphyritic quartz monzonite - generally yellowish-gray to grayish-orange in color. Fresh and unaltered specimens contain numerous flesh colored phenocrysts of orthoclase and microcline, partly perthitic, up to 1.5 inches in length, in a coarse grained groundmass of quartz, plagioclase, and biotite. Accessory minerals include zircon, sphene and magnetite.

0-200': plagioclase altered 10% to sericite, 40% to clay, 5% to carbonate, 2% to chlorite, 1% to epidote; K-spar generally fresh (microcline) - minor alteration to clay (2%), epidote (1%) and chlorite (trace); biotite altered to chlorite (30%) and epidote (15%) plus minor carbonate. The clay alteration noted decreases downward & is probably supergene.

PROJECT KELVIN DRILL HOLE NO. J-2 SCALE 1" = 700' PAGE NO. 2 OF 5

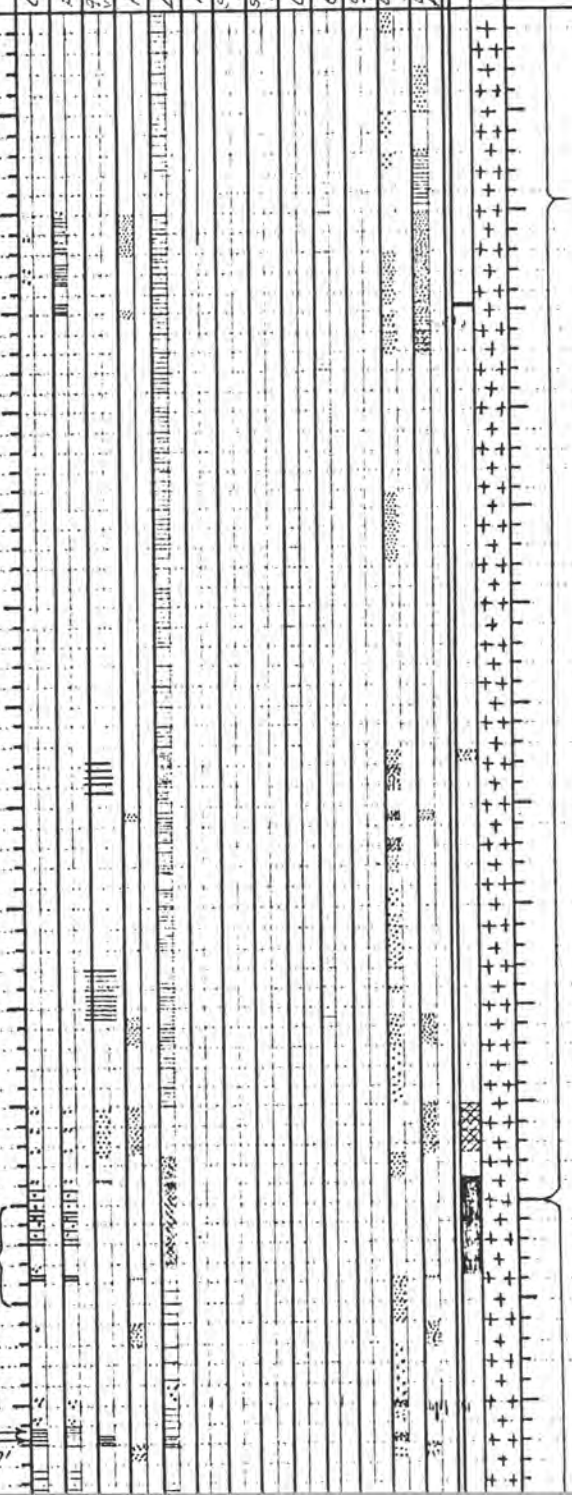
LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	weight % sulfide	py/cp
	0.12	.0021	.0003	.0200	.039	5.4
800						
	0.43	.0025	.0001	.0100	.021	1.9
	0.04	.0121	<.0001	.1200	.237	5.8
900						
	0.31	.0040	.0001	.0200	.042	2.6
	0.86	.0020	<.0001	.0300	.058	9.0
1000						
	0.27	.0070	<.0001	.0400	.082	3.1
	0.57	.0015	<.0001	.0200	.039	8.1
1100						
	0.23	.0016	<.0001	.0200	.039	7.4
	0.01	.0057	<.0001	.0100	.024	0.48
1200						
	0.38	.0010	<.0001	.0400	.076	25.1
	0.43	.0058	<.0001	.0200	.043	1.5
1300						
	0.26	.0529	<.0001	.2700	.465	2.0
	0.09	.2042	<.0001	.7200	1.552	1.6
1400						
	0.25	.0151	.0008	.0400	.090	1.7
	0.39	.0725	.0008	.1400	.334	0.60

Miscellaneous

3700 ppm zinc (compared to 63 ppm above and 28 ppm below).

Manganese oxides (4') on fractures

trace native copper as small octohedral crystals - 1469'



Summary Lithology & Alteration Log

Plagioclase altered to sericite (55%), chlorite (5%), epidote (3%), clay (2%), carbonate (2%) plus trace amounts of secondary K-spar, quartz and hematite. K-spar altered to sericite (10%), chlorite (3%), clay (2%), carbonate (2%) and quartz (2%) plus trace amounts of epidote, hematite and secondary K-spar. Biotite altered to chlorite (50%), sericite (15%), epidote (10%) plus trace amounts of clay, carbonate and quartz. Overall alteration assemblage is weak to moderate (approximately 40% of the susceptible minerals are altered) PROPYLITIC (sericite-chlorite-epidote).

PROJECT KELVIN DRILL HOLE No. J-2 SCALE 1" = 100' PAGE NO. 3 OF 5

LENGTH	% Fe_3O_4 (comp.)	Cu	Mo	S	weight % sulfide	py/cp
	0.55	.1954	.0010	.5000	1.131	1.0
	0.41	.0166	.0013	.2000	.391	7.2
1600	0.01	.0547	.0013	.4800	.953	5.0
	0.29	.0321	.0002	.4600	.893	8.6
1700	0.41	.0259	.0010	1.0400	1.972	25.4
	0.38	.0644	.0017	.4600	.925	4.0
1800	0.52	.2540	.0022	.7600	1.676	1.3
	0.42	.0956	.0037	.6000	1.218	3.4
1900	0.02	.2494	.0062	.7200	1.596	1.2
	0.13	.1045	.0046	.4000	.853	1.8
2000	0.41	.0698				
	0.36	.0780				
2100	0.54	.0607	.0021	.3264	.671	2.8
2200						

Miscellaneous

trace cuprite (?) along some fractures.

trace cuprite (?) along some nearly vertical fractures

150' = 0.1997 % Copper + 0.0040 % Molubdenum = 0.2197 % Copper equiv. 1.497 % total sulfide py:cp = 1.6:1.0

trace cuprite (?) along some fractures.

pyrite and chalcopyrite occur mostly in veinlets as does weak molybdenum. Disseminations are secondary. True veins are absent.

Summary Lithology & Alteration Log

Plagioclase altered to sericite (55%), epidote (2%), K-spar (1%), chlorite (1%), quartz (1%) plus a trace of hematite. K-spar altered to sericite (5%), secondary K-spar (7%), chlorite (3%), quartz (3%), Carbonate (1%) plus a trace of epidote & hematite. Biotite altered to chlorite (65%), epidote (5%), sericite (...) and carbonate (2%). Alteration assemblage nearly identical to that described above with a slight decrease in the amount of sericite & a slight increase in the amount of secondary K-spar. Weak to moderate PROPYLITIC (approximately 40% of the susceptible minerals are altered. Marked increase in total sulfides, copper and molybdenum in this zone as compared to the zone above.

NOTE: all alteration descriptions above taken from thin section descriptions only.

strong limonite staining of plagioclase (sericitized).

Cu FeS2 | pyrite | quartz in vns & vnlts | Fe3O4 | Limonite | MoS2 | secondary biotite | secondary K-spar | CaCO3 | Epidote | green sericite | white sericite | chlorite + sericite | STRUCT. | ROCK

0.37 | 0.46 | 0.45 | 0.66 | 0.50

pegr

ROJECT KELVIN DRILL HOLE J-2 SCALE 1"=100' PAGE NO. 4 OF 5

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mn	S	calc. wt % sulfide	Py/cp	Miscellaneous
2300							
2400							2', approximately 13% pyrite (by weight) in coarse blebs throughout rock.
2500	0.53	.0236	.0023	.2014	0.400	4.9	pyrite and chalcopyrite in disseminations and veinlets (approx. equal). Molybdenum weak-generally along veinlets. Pyrite to chalcopyrite ratio increases from that above. Total sulfides decrease.
2600							73 ppm zinc (compared to 28 ppm above and 32 ppm below).
2700							2697' reduced to BX wireline
	0.31	.0238	.0008	.4423	0.852	11.4	10', approximately 4% (wt) pyrite in breccia-crystals common. pyrite common in fine disseminations much more common than in veinlets. Chalcopyrite in disseminated equal to veinlets. Molybdenum generally absent except occassionally discontinuously along quartz veins.
2800							
2900	1.00	.0075	.0011	.2872	0.545	24.2	Chalcopyrite extremely rare, Pyrite in veinlets and disseminated (approx equal). Numerous quartz veins, generally barren. Molybdenum generally absent.

Chalcopy | Pyrite | Quartz in vns/vnlts | Tex O_4 | Limonite | Mole | Secondary biotite | Secondary K-spar | $CaCO_3$ | Epidote | green sericite | white sericite | chlorite sericite | STRUCT. | ROCK

Tex O_4: 0.58, 0.67, 0.64, 0.39, 0.49, 0.54, 0.59, 0.51, 0.32, 0.16, 0.41, 0.46, 0.34, 0.43, 1.20

low magnetite zone

Summary Lithology & Alteration Log

Plagioclase is generally fresh to weakly altered to white sericite, locally strongly to green sericite - a trace of secondary K-spar occurs throughout the interval along rims of some plagioclase grains. K-spar generally fresh to weak incipient recrystallization to secondary K-spar. Secondary biotite generally absent. Carbonate weak to moderate along fractures and infrequent veins. Epidote common & locally strong in rock matrix & as alteration of mafics. 70% of susceptible minerals are alter moderate to strong PROPYLITIC?

Moderate-strong development of epidote.

2400-2665: chlorite along fractures commo

Moderate alteration of plagioclase to white serici decrease in epidote abundance.

Plagioclase usually completely altered to green sericite K-spar generally altered, partially to completely to serici chlorite. Carbonate relatively common - some of which replaces plagioclase (in trace amounts). Noticeable increase in limonite (brick red) along fractures. T sulfides increased by 2X from that above or be Magnetite is low & has apparently been destroye Increase in white sericite alteration of plagiocla immediately above and below zone. Gouge, broke brecciated rock more common than above or bel Possible fault zone (or sheared zone).

[illegible] Moderate [illegible] 85% of [illegible]

2810-2820: intimate mixture of Precambrian Oracle Gran and Tertiary-Cretaceous Melanocratic Rhyodacite Porp [illegible] phenocrysts up to 0.3 inch [illegible] phenocrysts up to 0.1 inch (which are [illegible] to sericite and minor clay occur in a [illegible] defined groundmass of abundant secondary biotite, qu K-feldspar & rare epidote, approximately 0.8% magnetite abundant fine grained disseminated pyrite are prese

2931-2935 } Tertiary-Cretaceous Melanocratic Rhyodacite
2961-2962 } Porphyry: [illegible] description [illegible]

Strong development of secondary K-spar, secondary bi and quartz (barren) veining. Sudden and marked dec in epidote and sericite (white & green), and chalcop Marked increase in pyrite chalcopyrite ratio. Inc only non Precambrian granitic rocks seen in hole [illegible]

2901-3014: Precambrian (?) Fine Grained Diabase

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE NO. J-2 SCALE 1"=100' PAGE NO. 5 OF 5

LENGTH	% Fe_3O_4 comp	ASSAYS (%) Cu	Mo	S	weight % sulfide	py/cp	Miscellaneous	$CuFeS_2$	pyrite	quartz in vns & volts	Fe_3O_4	Limonite	MoS_2	secondary biotite	secondary K-spar	$CaCO_3$	Epidote	green sericite	white sericite	chlorite & sericite	STRUCT.	ROCK	Summary Lithology & Alteration Log
							3014 feet is total length																contains 4.46% disseminated magnetite.

2018-3014 logged by: J.P. VROMAN

collar location: approximately 1000' FSL & 3000' FWL, section 9, T.4S., R.13E., Pinal Co., Arizona
collar elevation: approx. 2080'
inclination: -90° (acid survey at 1987' = -85°±).

Drilling Contractor: Joy Manufacturing Co.

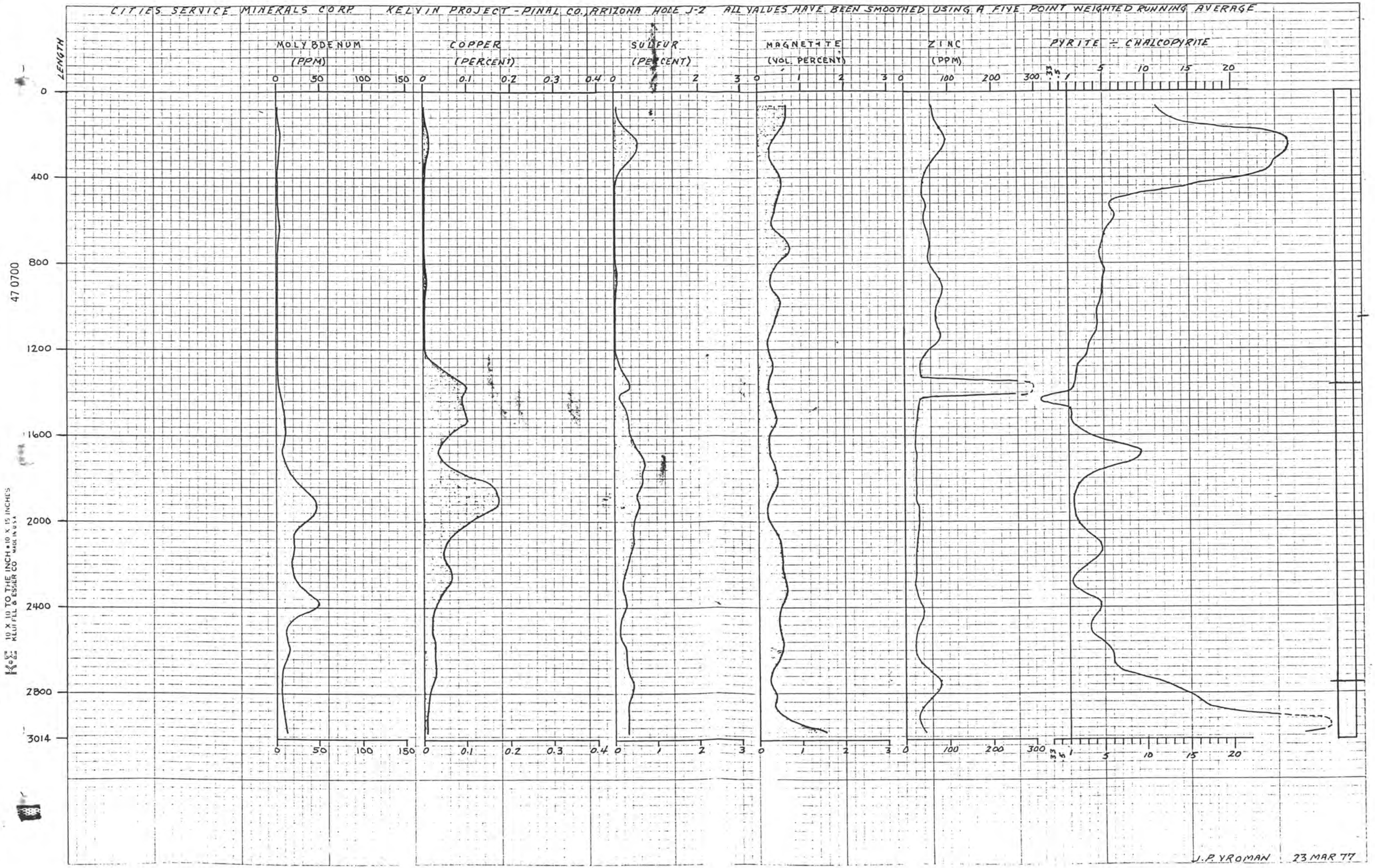
Average footage/shift: 13.0
Direct Drilling Cost: 10.86 /ft
casing lost in hole: .99 /ft
Mud, additives, water: .92 /ft
reaming, cleaning, standby: .78 /ft
set & pull casing .67 /ft
Assaying .61 /ft
splitting .22 /ft
Thin sections .06 /ft
TOTAL $15.10 /ft

CASING LEFT IN HOLE:
0-40' = 40' NX
2000-2697 - 697' BX
cut at 2600, 2400' & 2200'

date started: 30 AUG 1974
date completed (2018') 31 OCT 74
date re-entered: 9 NOV 1976
date completed (3014) 21 DEC 1976

HOLE SIZE:
0-40': 4½ inch rock bit
40-2697': NX wireline core
2697-3014': BX wireline core

CITIES SERVICE MINERALS CORP. KELVIN PROJECT - PINAL CO., ARIZONA HOLE J-2 ALL VALUES HAVE BEEN SMOOTHED USING A FIVE POINT WEIGHTED RUNNING AVERAGE



Cp = 4.2 (.64)
Py = 5.0 (.54)

EFFICIENCY LINE NO. 6636

KELVIN PROJECT : CLIMAX HOLE J-2
PAGE 1 of 2
0-2018 feet completed 20 Oct. 75

interval	1 % Cu (ASSAY)	2 wt % Cp	3 % S in Cp.	4 % S (ASSAY)	5 % S in py	6 wt % py	7 TOTAL SULFIDES	8 Py / Cp	9 % Mo (ASSAY)	10 % Fe_3O_4	11 % Zn (ASSAY)	12	13
		% Cu × 2.8885	% Cu × 1.00925		Column 4 minus Column 3	Column 5 × 1.871	column 2 + column 6	column 6 ÷ column 2					
45-100 1	.0020	.0058	.0020	.10	.0980	.183	.19	31.6	.0002	.69	.0059	0-1300 feet	
100-150 2	.0070	.0202	.0071	.02	.0129	.024	.04	1.2	.0003	.57	.0065	.0047 % copper	
150-200 3	.0018	.0052	.0018	.04	.0382	.071	.08	13.7	.0003	.76	.0064	.0136 wt % chalcop	
200-250 4	.0184	.0531	.0186	.88	.8614	1.612	1.66	30.4	.0007	.29	.0130	.0087 vol % "	
250-300 5	.0207	.0598	.0209	.84	.8191	1.533	1.59	25.6	.0003	.01	.0104	.1850 wt. % pyrit	
300-350 6	.0034	.0098	.0034	.06	.0566	.106	.12	10.8	.0002	.42	[illegible]	.1000 vol. % "	
350-400 7	.0018	.0052	.0018	.12	.1182	.221	.23	42.5	.0002	.41	.0051	.1986 wt % sulfid	
400-450 8	.0014	.0040	.0014	.03	.0286	.054	.06	13.5	<.0001	.65	[illegible]	.1087 vol. % "	
450-500 9	.0018	.0052	.0018	.02	.0182	.034	.04	6.5	<.0001	.55	.0046	py : cp = 13.6:1.0 (	
500-550 10	.0030	.0087	.0030	.02	.0170	.032	.04	3.7	<.0001	.27	.0068	0.41 % magnetite	
550-600 11	.0026	.0075	.0026	.04	.0374	.070	.08	9.3	.0002	.59	.0074	.0002 % molybde	
600-650 12	.0026	.0075	.0026	.02	.0174	.033	.04	4.4	.0005	.05	.0045	.0062 % [illegible]	
650-700 13	.0021	.0061	.0021	.02	.0179	.033	.04	5.4	.0005	—.—	[illegible]		
700-750 14	.0036	.0104	.0036	.03	.0264	.049	.06	4.7	.0003	1.13	[illegible]		
750-800 15	.0021	.0061	.0021	.02	.0179	.033	.04	5.4	.0003	.42	[illegible]		
800-850 16	.0025	.0072	.0025	.01	.0075	.014	.02	1.9	.0001	.43	[illegible]		
850-900 17	.0121	.0350	.0122	.12	.1078	.202	.24	5.8	<.0001	.04	[illegible]		
900-950 18	.0040	.0116	.0040	.02	.0160	.030	.04	2.6	.0001	.31	[illegible]		
950-1000 19	.0020	.0058	.0020	.03	.0280	.052	.06	9.0	<.0001	.86	[illegible]		
1000-1050 20	.0070	.0202	.0071	.04	.0329	.062	.08	3.1	<.0001	.27	[illegible]		
1050-1100 21	.0015	.0043	.0015	.02	.0185	.035	.04	8.1	<.0001	.57	.0041		
1100-1150 22	.0016	.0046	.0016	.02	.0184	.034	.04	7.4	<.0001	.23	.0104		
1150-1200 23	.0057	.0165	.0058	.01	.0042	.008	.02	.48	<.0001	.00	.0073		
1200-1250 24	.0010	.0029	.0010	.04	.0390	.073	.08	25.1	<.0001	.38	[illegible]		
1250-1300 25	.0058	.0168	.0059	.02	.0141	.026	.04	1.5	<.0001	.42	[illegible]		
1300-1350 26	.0529	.1528	.0534	.22	.1666	.312	.46	2.0	<.0001	.26	[illegible]	1300-2680	
1350-1400 27	.2042	.5898	.2061	.72	.5139	.962	1.55	1.6	<.0001	.09	.3700	.0727 % Copper	
1400-1450 28	.0151	.0436	.0152	.04	.0248	.046	.09	1.1	.0008	.25	.0034	.2100 wt % chalcop	
1450-1500 29	.0725	.2094	.0732	.14	.0668	.125	.33	.60	.0008	.39	[illegible]	.1344 vol % "	
1500-1550 30	.1954	.5644	.1972	.50	.3028	.567	1.13	1.0	.0010	.55	[illegible]	.5576 wt % pyri	
1550-1600 31	.0166	.0479	.0168	.20	.1832	.343	.39	7.2	.0013	.41	[illegible]	.3011 vol % "	
1600-1650	.0547	.1580	.0552	.48	.4248	.795	.95	5.0	.0013	.00	[illegible]	.7687 wt % sulfi	
1650-1700	.0321	.0927	.0324	.46	.4276	.800	.89	8.6	.0002	.29	[illegible]	.4355 vol % sulfi	
												~~py : cp = 2.7:1.0~~	
												.0020 % m[illegible]	
												0.41 % magnetit	

AMPCO EFFICIENCY LINE NO. 6636

KELVIN PROJECT: CSMC HOLE J-2
PAGE 2 of 2
2018 - 3014 feet completed 18 Jan 77

Interval	ASSAY 1 % Cu	2 wt % Cp.	3 % S in Cp	ASSAY 4 % S	5 % S in py	6 wt % py	7 TOTAL SULFIDES	8 py/cp	9 % Mo	ASSAY 10 % Fe_3O_4	ASSAY 11 % Zr	12	13
1700-1750 1	.0259	.0748	.0261	1.04	1.0139	1.897	1.97	25.4	.0010	.41	.0036		
1750-1800 2	.0644	.1860	.0650	.46	.3950	.739	.93	4.0	.0017	.38	.0025		
1800-1850 3	.2540	.7337	.2563	.76	.5037	.942	1.68	1.3	.0022	.52	.0023		
1850-1900 4	.0956	.2761	.0965	.60	.5035	.942	1.22	3.4	.0037	.42	.0017		
1900-1950 5	.2494	.7204	.2517	.72	.4683	.876	1.60	1.2	.0062	.02	.0046		
1950-2000 6	.1045	.3018	.1055	.40	.2945	.551	.85	1.8	.0046	.13	.0020		
2000-2040 7	.0739	.2135	.0746	.3970	.3224	.603	.82	2.8	.0018	.39	.0023		
2040-2080 8	.0758	.2189	.0765	.3750	.2985	.558	.78	2.6	.0014	.48	.0022		
2080-2120 9	.0510	.1473	.0515	.5820	.5305	.993	1.14	6.7	.0024	.48	.0026		
2120-2160 10	.0382	.1103	.0386	.3310	.2924	.547	.66	5.0	.0028	.51	[illegible]		
2160-2200 11	.0414	.1196	.0418	.3470	.3052	.571	.69	4.8	.0009	.60	.0026		
2200-2240 12	.0747	.2158	.0754	.3180	.2426	.454	.67	2.1	.0013	.48	.0020		
2240-2280 13	.0624	.1802	.0630	.1650	.1020	.191	.37	1.1	.0023	.57	.0025		
2280-2320 14	.0812	.2345	.0820	.1670	.0850	.159	.39	.68	.0028	.67	.0016		
2320-2360 15	.0222	.0641	.0224	.1860	.1636	.306	.37	4.8	.0012	.64	.0013		
2360-2400 16	.0282	.0815	.0285	.3710	.3425	.641	.72	7.9	.0100	.63	.0014		
2400-2440 17	.0282	.0815	.0285	.1655	.1370	.256	.34	3.1	.0021	.36	.0066		
2440-2480 18	.0233	.0673	.0235	.1435	.1200	.224	.29	3.3	.0012	.43	.0019		
2480-2520 19	.0177	.0511	.0179	.1105	.0926	.173	.22	3.4	.0011	.58	.0014		
2520-2560 20	.0210	.0607	.0212	.0925	.0713	.133	.19	2.2	.0010	.56	.0023		
2560-2600 21	.0345	.0996	.0348	.3400	.3052	.571	.67	5.7	.0024	.58	.0021		
2600-2640 22	.0232	.0670	.0234	.3310	.3076	.576	.64	8.6	.0012	.52	.0023		
2640-2680 23	.0140	.0404	.0141	.0725	.0584	.109	.15	2.7	.0007	.46	.0019		
2680-2720 24	.0429	.1239	.0433	.3522	.3089	.578	.70	4.7	.0008	.16	[illegible]	2680-2840	
2720-2760 25	.0175	.0505	.0177	.5870	.5693	1.065	1.12	21.1	.0007	.13	.0150	.0238 % copper	
2760-2800 26	.0128	.0370	.0129	.2460	.2331	.436	.47	11.8	.0007	.48	.0037	.0008 % molybde	
2800-2840 27	.0218	.0630	.0220	.5840	.5620	1.052	1.12	16.7	.0008	.48	.0072	.31 % magneti	
2840-2880 28	.0080	.0231	.0081	.0990	.0909	.170	.19	7.4	.0006	.27	.0024	.852 % (wt) sulfi	
2880-2920 29	.0076	.0219	.0077	.4100	.4023	.753	.77	34.4	.0011	.34	.0023	py:cp = 11.4:1	
2920-2960 30	.0067	.0194	.0068	.3400	.3332	.623	.64	32.1	.0010	.61	.0022	2840'-3014'	
2960-3014 31	.0075	.0217	.0076	.3000	.2924	.547	.57	25.2	.0015	2.39	.0021	.0075 % copper	
												.0011 % molybden	
												1.00 % magnetite	
												0.43% " (w/o dia	
												.0032% Zr	

AMIRAN EFFICIENCY LINE NO. 6636

C.S.M.C. KELVIN PROJECT - HOLE J-2

FIVE POINT WEIGHTED RUNNING AVERAGES

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5	6 wt % py	7 Py/Cp	8	9	10 Vol % Cp	11 Vol % py	Vol % Fe_3O_4	13 Mc
										Cu x 1.8363	wt Py x 0.532		
45-100 1	.0036	.0002	.0062	.067		.1186	11.4			.0066	.0631	.658	11.8
100-150 2	.0054	.0003	.0069	.117		.2087	13.4			.0099	.1110	.624	11.2
150-200 3	.0083	.0004	.0082	.295		.5362	22.3			.0152	.2853	.545	12.7
200-250 4	.0131	.0004	.0096	.548		1.0005	26.4			.0241	.5323	.365	13.8
250-300 5	.0133	.0004	.0086	.552		1.0076	26.2			.0244	.5361	.258	12.3
300-350 6	.0080	.0003	.0061	.315		.5742	24.8			.0147	.3055	.331	9.8
350-400 7	.0035	.0002	.0046	.133		.2422	24.0			.0064	.1289	.448	7.0
400-450 8	.0019	.0001	.0043	.050		.0900	16.4			.0035	.0479	.525	7.9
450-500 9	.0020	.0001	.0040	.032		.0561	9.7			.0037	.0298	.501	8.0
500-550 10	.0025	.0002	.0049	.025		.0421	5.8			.0046	.0224	.421	6.7
550-600 11	.0026	.0003	.0044	.028		.0475	6.3			.0048	.0253	.372	6.0
600-650 12	.0026	.0004	.0047	.025		.0419	5.6			.0048	.0223	.342	5.5
650-700 13	.0026	.0004	.0053	.024		.0400	5.3			.0048	.0213	.569	8.9
700-750 14	.0027	.0003	.0057	.023		.0379	4.9			.0050	.0202	.739	11.5
750-800 15	.0033	.0003	.0056	.028		.0462	4.8			.0061	.0246	.568	9.0
800-850 16	.0044	.0002	.0063	.040		.0665	5.2			.0081	.0354	.332	6.4
850-900 17	.0065	.0001	.0081	.057		.0944	5.0			.0119	.0502	.285	4.3
900-950 18	.0055	.0001	.0085	.046		.0757	4.8			.0101	.0403	.381	6.5
950-1000 19	.0044	.0001	.0078	.036		.0590	4.6			.0081	.0314	.512	8.3
1000-1050 20	.0039	.0001	.0073	.030		.0488	4.3			.0072	.0259	.475	7.6
1050-1100 21	.0032	.0001	.0073	.025		.0407	4.4			.0059	.0217	.400	6.4
1100-1150 22	.0029	.0001	.0081	.021		.0338	4.0			.0053	.0180	.270	4.4
1150-1200 23	.0034	.0001	.0071	.021		.0329	3.3			.0062	.0175	.217	3.6
1200-1250 24	.0072	.0001	.0046	.041		.0631	3.0			.0132	.0336	.281	4.9
1250-1300 25	.0308	.0001	.0318 36	.124		.1738	2.0			.0566	.0925	.316	7.0
1300-1350 26	.0700	.0002	.0883 38	.262		.3580	1.8			.1285	.1905	.266	8.8
1350-1400 27	.1003	.0003	.1447	.349		.4636	1.6			.1841	.2466	.215	9.7
1400-1450 28	.0888	.0006	.0881 34	.120		.0563	.22			.1630	.0392	.269	6.9
1450-1500 29	.0934	.0008	.0315 12	.249		.2895	1.1			.1715	.1540	.373	10.5
1500-1550 30	.1011	.0010	.0029	.311		.3910	1.3			.1856	.2080	.415	12.1
1550-1600 31	.0721	.0011	.0024	.349		.5168	2.5			.1324	.2749	.337	11.2
1600-1650	.0493	.0010	.0022	.455		.7582	5.3			.0905	.4033	.235	10.9
1650-1700	.0372	.0008	.0023	.578		1.0111	9.4			.0683	.5379	.267	13.1

AMPAD EFFICIENCY LINE NO. 6636

Cu x 1.8363

C.S.M.C. KELVIN PROJECT - HOLE J-2

FIVE POINT WEIGHTED RUNNING AVERAGES

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5	6 wt % py	7 py/cp	8	9	10 vol % cp	11 vol % py	12 vol % Fe_3O_4	13 Mc
1100-1150 1	.0560	.0011	.0027	.703		1.2095	7.5			.1028	.6435	.352	16.5
1150-1800 2	.0992	.0017	.0027	.674		1.0737	3.7			.1822	.5712	.391	17.2
1800-1850 3	.1558	.0026	.0027	.672		.9631	2.1			.2861	.5123	.418	18.2
1850-1900 4	.1659	.0038	.0027	.562		.7382	1.5			.3046	.3927	.325	15.3
1900-1950 5	.1673	.0046	.0031	.597		.8010	1.7			.3072	.4261	.205	14.1
1950-2000 6	.1280	.0040	.0030	.487		.6694	1.8			.2350	.3561	.214	12.1
2000-2040 7	.0931	.0027	.0030	.432		.6324	2.4			.1710	.3365	.329	12.5
2040-2080 8	.0690	.0021	.0029	.426		.6667	3.3			.1267	.3547	.435	13.7
2080-2120 9	.0548	.0021	.0028	.444		.7272	4.6			.1006	.3869	.489	14.6
2120-2160 10	.0476	.0021	.0026	.395		.6491	4.7			.0874	.3453	.519	14.3
2160-2200 11	.0507	.0018	.0024	.341		.5422	3.7			.0931	.2885	.540	13.8
2200-2240 12	.0619	.0019	.0023	.279		.4051	2.3			.1137	.2155	.545	13.1
2240-2280 13	.0649	.0021	.0022	.216		.2816	1.5			.1192	.1498	.580	12.7
2280-2320 14	.0587	.0028	.0021	.198		.2596	1.5			.1078	.1381	.622	13.0
2320-2360 15	.0408	.0038	.0025	.221		.3364	2.9			.0749	.1790	.618	13.1
2360-2400 16	.0305	.0049	.0033	.248		.4064	4.6			.0560	.2162	.558	12.5
2400-2440 17	.0258	.0036	.0041	.205		.3348	4.5			.0474	.1781	.477	10.5
2440-2480 18	.0233	.0017	.0036	.154		.2441	3.6			.0428	.1299	.474	9.7
2480-2520 19	.0219	.0013	.0028	.136		.2131	3.4			.0402	.1134	.524	10.2
2520-2560 20	.0237	.0014	.0023	.176		.2845	4.2			.0435	.1514	.556	11.3
2560-2600 21	.0259	.0016	.0022	.243		.4057	5.4			.0476	.2158	.552	12.2
2600-2640 22	.0250	.0013	.0022	.257		.4336	6.0			.0459	.1873	.495	10.9
2640-2680 23	.0246	.0010	.0034	.257		.4344	6.1			.0452	.2311	.383	10.0
2680-2720 24	.0265	.0008	.0057	.332		.5711	7.5			.0487	.3038	.275	9.4
2720-2760 25	.0223	.0007	.0081	.414		.7324	11.4			.0409	.3897	.270	10.5
2760-2800 26	.0179	.0007	.0070	.400		.7146	13.8			.0329	.3801	.358	11.6
2800-2840 27	.0151	.0007	.0055	.381		.6843	15.7			.0277	.3640	.394	11.8
2840-2880 28	.0114	.0008	.0036	.313		.5641	17.1			.0209	.3001	.377	10.5
2880-2920 29	.0086	.0010	.0030	.327		.5955	24.0			.0158	.3168	.555	13.3
2920-2960 30	.0060	.0011	.0032	.327		.6005	34.6			.0110	.3194	.959	19.3
2960-3014 31	.0042	.0013	.0044	.326		.5963	28.7			.0132	.3172	1.569	23.5

AMPAD EFFICIENCY LINE NO. 6636

INTERVAL	PLAGIOCLASE ser	clay	K-spar	chl.	CO_3	Epi	qtz	hem		K-spar ser	clay	K-spar	chl	CO_3	Epi	qtz	hem.		Mafics ser.	clay	chl	CO_3	epi	qtz	Hgo	
0-200 1	10	40	—	2	5	1	—	—	60	—	2	—	T	—	1	—	—	5	—	—	30	1	15	—	—	—
200-1350 2	55	2	T	5	2	3	T	T	[illegible]	10	2	T	3	2	T	2	T	[illegible]	15	T	50	T	10	T	T	T
1350-2120 3	55	T	1	1	—	2	T	T	[illegible]	5	—	10	3	T	T	2	T	20	2	—	65	2	5	—	—	—
2120-3014 4	50	—	10	5	3	—	T	T	70	10	—	75	5	T	1	1	1	[illegible]	20	—	40	1	1	—	T	T
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										
13																										
14																										
15																										
16																										
17																										
18																										
19																										
[illegible] 18 20	56		1	1		2	1	T		5		7	3		T	2	T		2		60	2	4			
21																										
22																										
23																										
24																										
25																										
0-200 26	10	40	—	2	5	1			[illegible]		2		T		1						30	1	15			
200-1350 27	55	2	T	5	2	3	T	T	[illegible]	10	2	T	3	2	T	2	T		15	T	50	T	10	T		
1350-2320 28	49	T	1	T		1	T	T	[illegible]	4		10	2	T	T	2	T		2		60	1	5			
2320-2680 29	60		8	8	8				[illegible]	2		68	T	T					14		52	2				
2680-2840 30	53		10	4			1	2	[illegible]	22		56	15		2		2		34		39		1			
2840-3014 31	29		12	[illegible]	2				[illegible]			47	1		[illegible]	2			20	5	29	1				

AMPAD EFFICIENCY LINE NO. 6636

HOLE J-2

		PLAGIOCLASE										K-SPAR										MAFICS					
Depth	Rock	Sser	Ms	Kaol	Cz	P-gm	biot	dolm	chl.	Sepl	Ir ox	sser	qtz	clay	Sec. K-sp	chl.	epi	CO_3	hem	mic/chl	other	Musc	chl	dbi	CO_3	clay	other
71	Yr 1	10		25	10					2						Tr				m			55	30	5		
104	Yr 2	10		70					10					10						m			5	2			
137	Yr 3	20		40	10															m			35	5			
155	Yr 4	10		30						1							5			m			30	20			
223	Yr 5	80		?					20			80		?		20				m			80	2			
264	Yr 6	80		10					2			10?	30	10?		20						100					
324	Yr 7	50			5				4					5						m	15 albite	5	50	20		5	5 qtz
375	Yr 8	35		5						9			1				T						50	20			
449	Yr 9	30							1	5												✓	42	10			
518	Yr 10	95	2	8							1	2	2						10	m		70					
591	Yr 11	30		10	10					2		30		10			2	10		m			50	12			
705	Yr 12	30			5					9							1	1					8				Sec. mica
815	Yr 13	85							2	8			5							m			70	30			
863	Yr 14	85							15														80		5		
919	Yr 15	85			2				4	2		2						10				5	80	5			
1010	Yr 16	80							15			2						5					90				
1071	Yr 17	10			2				8	6					8		2			m			42	12			
1135	Yr 18	30		4?	5					8						2		5					35				
1142	Yr 19	90		?	5							5						5		m		50	50				
1214	Yr 20	40			5	4			10									2					90				5 rutile
1259	Yr 21	90							5			35	25									20	60				
1318	Yr 22	1								5						2	2						90	5			
1408	Yr 23	90		?												20		5					90		5		
1540	Yr 24	35				2									✓	T							45	10	10		
1652	Yr 25	50								8					35					m			45	12			
1770	Yr 26	25							✓	✓	✓									m			48	5			
1811	Yr 27	85										T				2			✓	m			80				
1847	Yr 28	95	5									5				2				m			90				
1970	Yr 29	35		?		5				✓	✓				25					m			50	8			sulfi
2058	Yr 30	20								✓	✓				15				✓	m			50	20			
2159	Yr 31	18				4									30					m			11*				
2332	Yr	80			5	✓						10			50					m			80				
2426	Yr	95		?	2	3									100							50	20				
2450	Yr 1	30			30				30			2			90	1		1				20	40				10
2528	Yr 2	25			5	15									100								40		10		4 sec bio
2622	Yr 3	70				20			12						99								80				10 leuc actin
2735	Yr 4	60									8					70	10?		8			30	30				leuco rutil
2747	Yr 5	60				10			8			2			98								80				
2791	Yr 6	35				30						10			90							50	50				
2808	Yr 7	95	5									95										80		3			10 leuc rutil
2853	Yr 8	15				10			10			2			94?	4						25	35				8 bio
2859	Yr 9	12				15			5				5		93?	2						35	30				5 leuc rutil
2900	Yr 10	40				15			5						100							25	15		2		10 mag
2922	Yr 11	15			10	10							5		94?	1							80				5 rutil
2934	porphyry	18				m	5 m		2						?									10			90 bio 10 qtz
2975	Yr	50		?		10									100							20	30			20?	5 rutil 80 [illegible] 10 bio
3003	db 14	8?		?				5							—												
	15																										
	16																										
	17																										
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THE KELVIN PROSPECT
PINAL CO., ARIZONA

for presentation at

SALT LAKE CITY, UTAH

December 1975

CITIES SERVICE MINERALS CORPORATION
ARIZONA DISTRICT

J. P. VROMAN 11/75

The Kelvin Prospect is located in the northern portion of the Tortilla Mountains and the northeastern portion of Pinal Co., Arizona. Tucson is 60 miles south of the prospect and Miami is 23 miles to the north-northeast (figure 1).

The Kelvin Prospect is situated within the Ray-Sacaton structural belt which bisects Pinal Co., Arizona (figure 2). Other features of interest within this belt include Kennecott's Ray Mine, Conoco's Poston Butte mineral deposit and ASARCO's Sacaton Mine.

The Kelvin Prospect had been explored by several companies prior to C.S.M.C. interest in the property. During 1968-1969 Minbanco drilled nine relatively shallow holes. During 1969-1970 Tipperary Resources Corporation geologically mapped the prospect at a scale of 1 inch equals 200 feet; conducted a detailed induced polarization survey (figure 3) and drilled two rotary holes. During early 1972 Cyprus Mines drilled one angle core hole on the property. Kerr McGee was the last company to option the property prior to C.S.M.C. work. They drilled one 500 foot core hole and terminated their option.

During late 1973 and 1974 C.S.M.C. geologist reviewed all the accumulated geological and geophysical data from the Kelvin Prospect as well as more regional geologic data from the surrounding area. Several nearby outcrops (but not exposed in the immediate area of the prospect) indicated that the prospect area may have been tectonically disturbed since Laramide time and may have been rotated easterly up to 90 degrees (figure 4). The review of the induced polarization data indicated that there was a true anomaly present on the property and the strongest portion of the anomaly had never been tested by drilling. From this work C.S.M.C. geologist developed an exploration model shown in Figure 5.

With this model in mind C.S.M.C. obtained a land position on the most favorable ground (figure 6). The 1520 acres $\pm$ presently held by C.S.M.C. includes unpatented lode mining claims and one section of state land.

To date C.S.M.C. has drilled two core holes on the property. Hole J-1 was collared first (figure 7). Due to the need to complete assessment work requirements drilling at J-1 was temporarily suspended and the rig moved to J-2. After completion of hole J-2 (figure 8) the rig was moved to hole J-1 and the hole was drilled to completion at 2478 feet on January 3, 1975.

Hole J-2 (figure 8) penetrated 1350 feet of relatively barren rock before crossing a fault. Above the fault copper values averaged less than 50 ppm. Within the fault zone copper values increased to 0.16%. Below the fault 400 feet

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

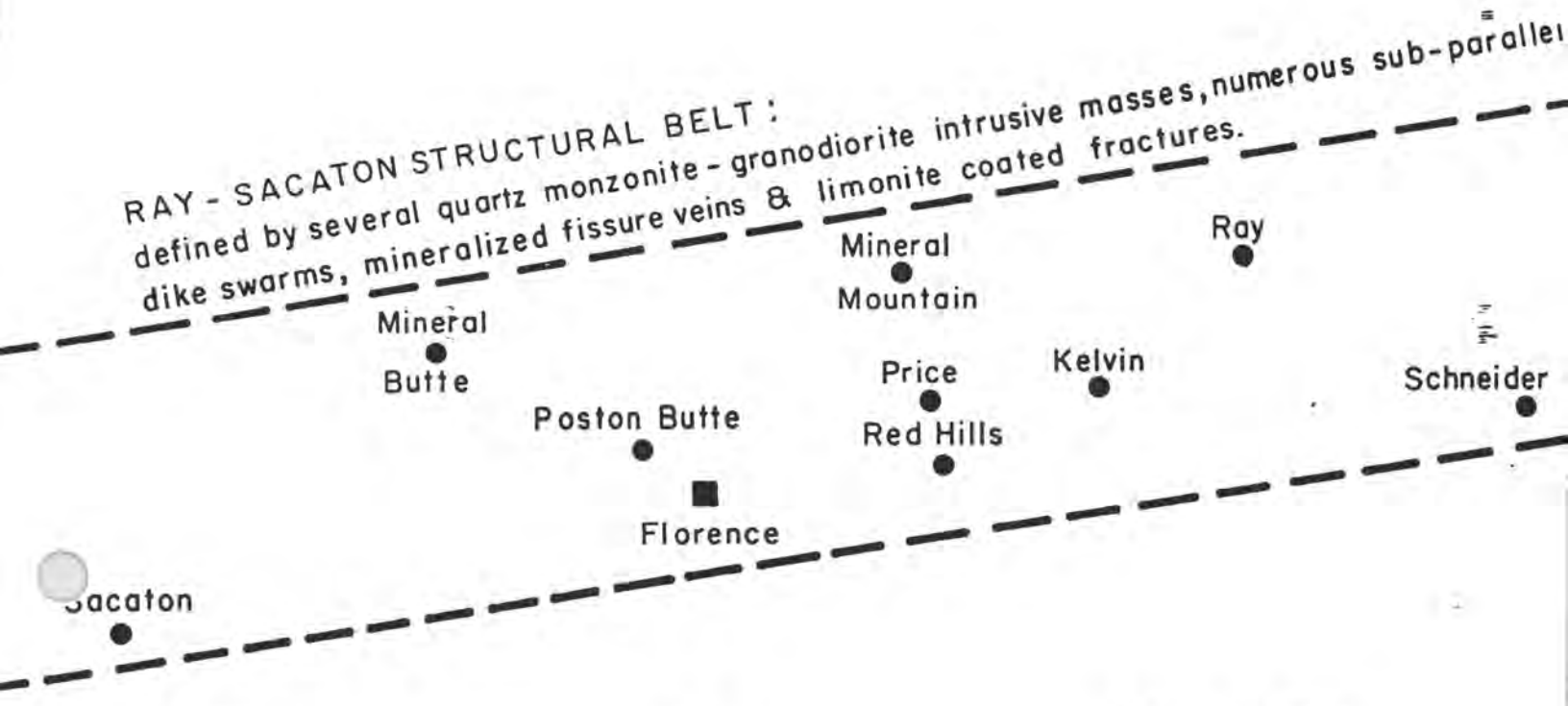
J. P. VROMAN 11/75

FIGURE 1

FILE NO.

CITIES SERVICE MINERALS CORPORATION

1" = 8 miles
or
SCALE 1:500,000
DATE 13 NOV 75
DRAWN BY J.P.V.



Major Production	Minor Production	Drilled By Cities Sub-marginal
Ray Sacaton	Red Hills	Schneider

Major Developing	Prospects
Poston Butte	Kelvin Price Mineral Butte Mineral Mountain

N

TITLE LOCATION MAP - KELVIN PROSPECT : PINAL CO., ARIZONA

SKETCH NO. FIGURE 2

of rock was penetrated that averaged o.06% copper. At 1780 feet ± a second fault was crossed. Rock below this fault averaged 0.17% copper. Trace amounts of molybdenum also increased as did total sulfide content.

Hole J-1 (figure 7) penetrated 1640 feet of rock averaging 0.06% copper. At 1640 feet a fault was crossed and the degree of alteration changed drastically. From 1640 feet to 1920 feet the rock averaged 0.15% copper. A second fault was crossed at 1920 feet. Immedi ately below this fault the rock was highly altered (strong phyllic) and 160 feet of rock was intercepted that averaged 0.66% copper. The entire interval below the lower fault (558 feet) averaged 0.23% copper. Included in this interval is 117 feet of barren post mineral (?) intrusive rock.

The results of this drilling and continued re-evaluation of all the existing data has caused us to modify our orignal concept to some extent. The generalized geology as we interpret it today is shown in figure 9. You will immediately note the two north-south trending low angle faults that dip to the west. It is presently believed that the easternmost of the faults is the "major structure" penetrated by both holes J-1 and J-2. A section drawn NE-SW (figure 10) through these two holes reveals the importance of this fault to our future exploration effort.

C.S.M.C. Arizona District geologist now propose to explore this interesting area by drilling a third new hole (J-3) and by deepening of some some of the more strategic existing holes.

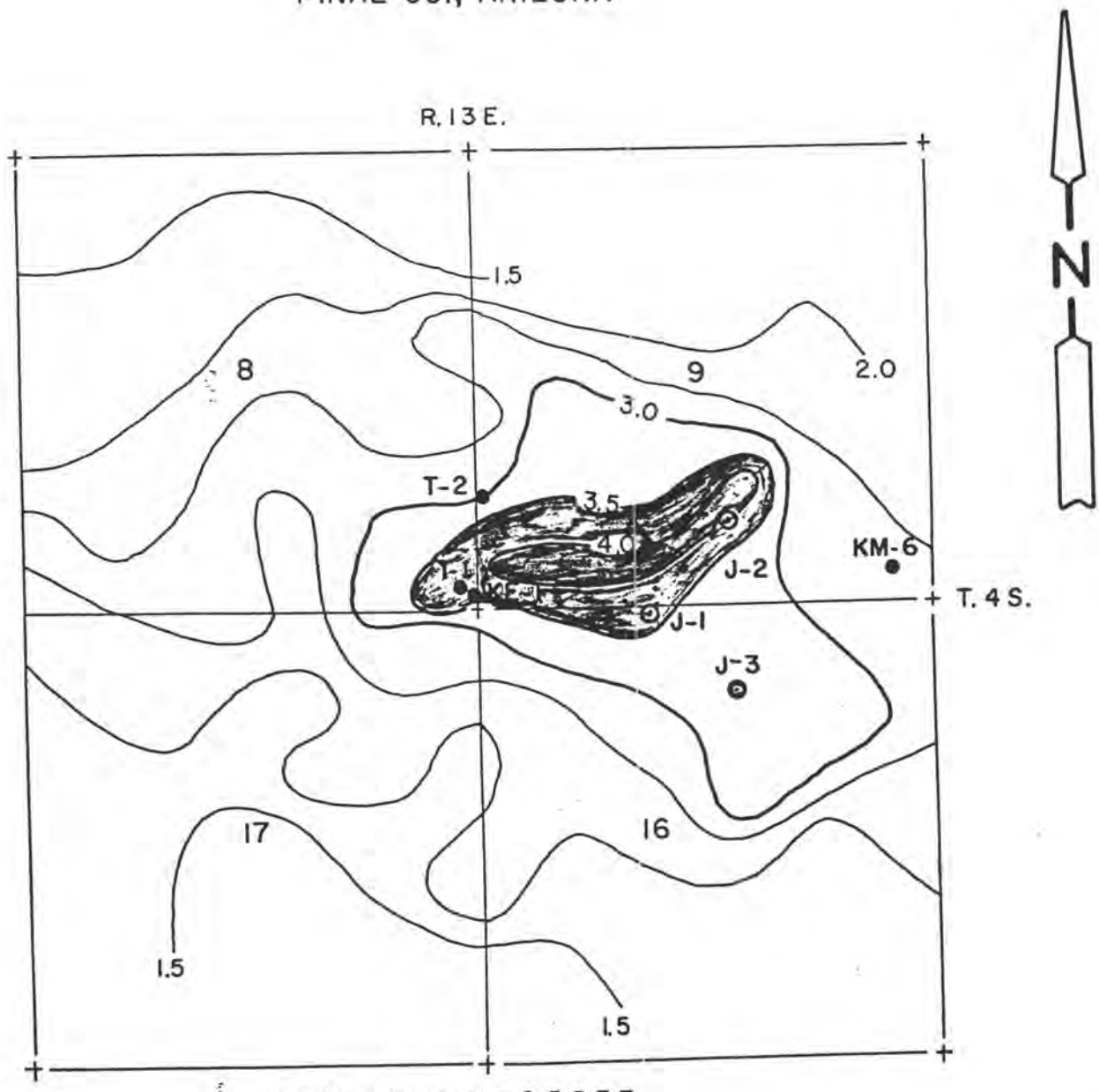
FILE NO.

CITIES SERVICE MINERALS CORPORATION

or
SCALE 1:24,000
DATE 14 NOV 75
DRAWN BY Vroman

INDUCED POLARIZATION SURVEY

PINAL CO., ARIZONA



contour interval = 0.5 P.F.E.

● = drillhole existing prior to C.S.M.C. work

⊙ = C.S.M.C. drillhole

T = Tipperary Resources

KE = Cyprus

KM = Kerr McGee

J = C.S.M.C.

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT AT "n"=3 SKETCH NO.

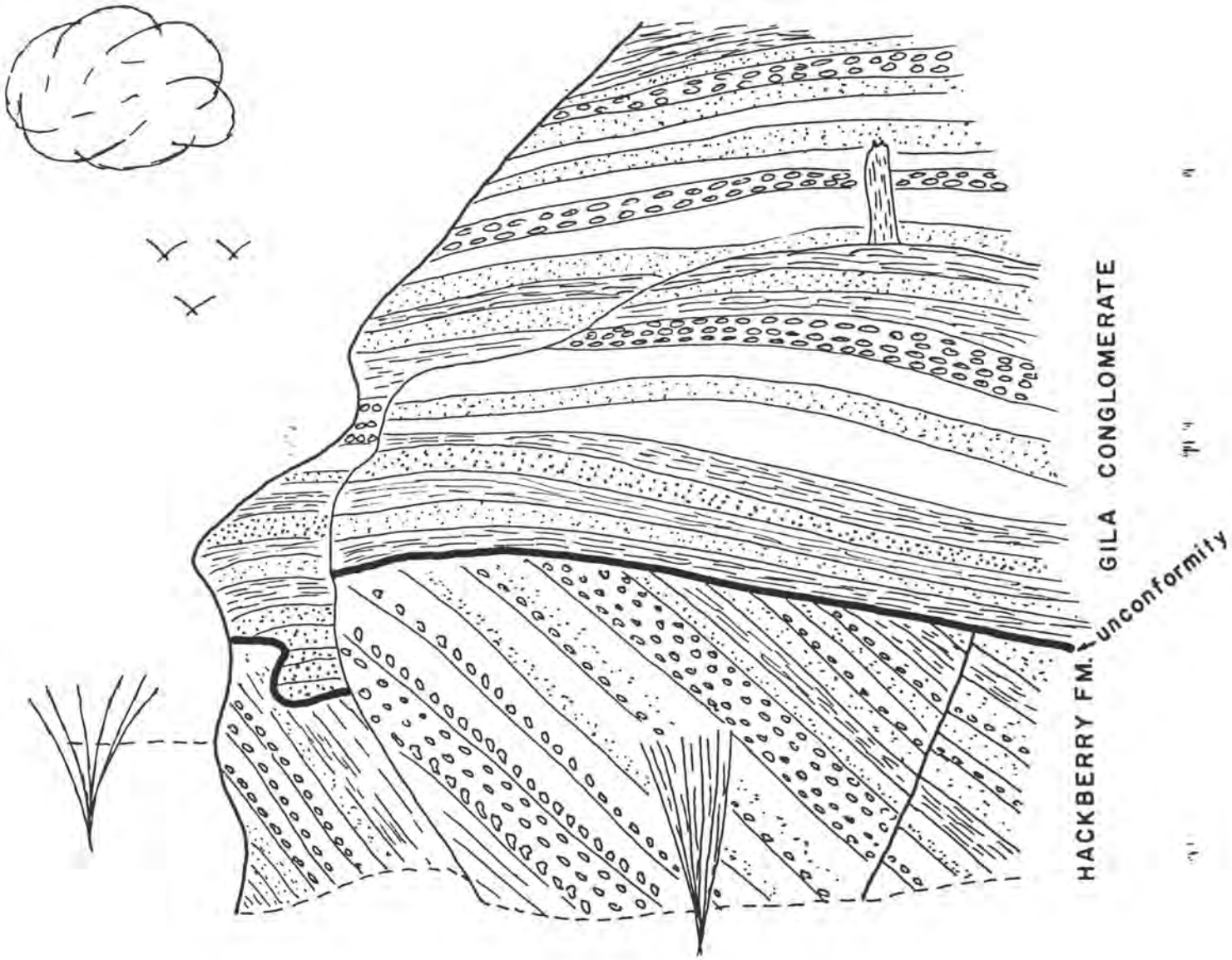
(P.F.E. over 3.0% in red)

FIGURE 3

FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE 1" = 10'
DATE 14 NOV 75
DRAWN BY Vroman



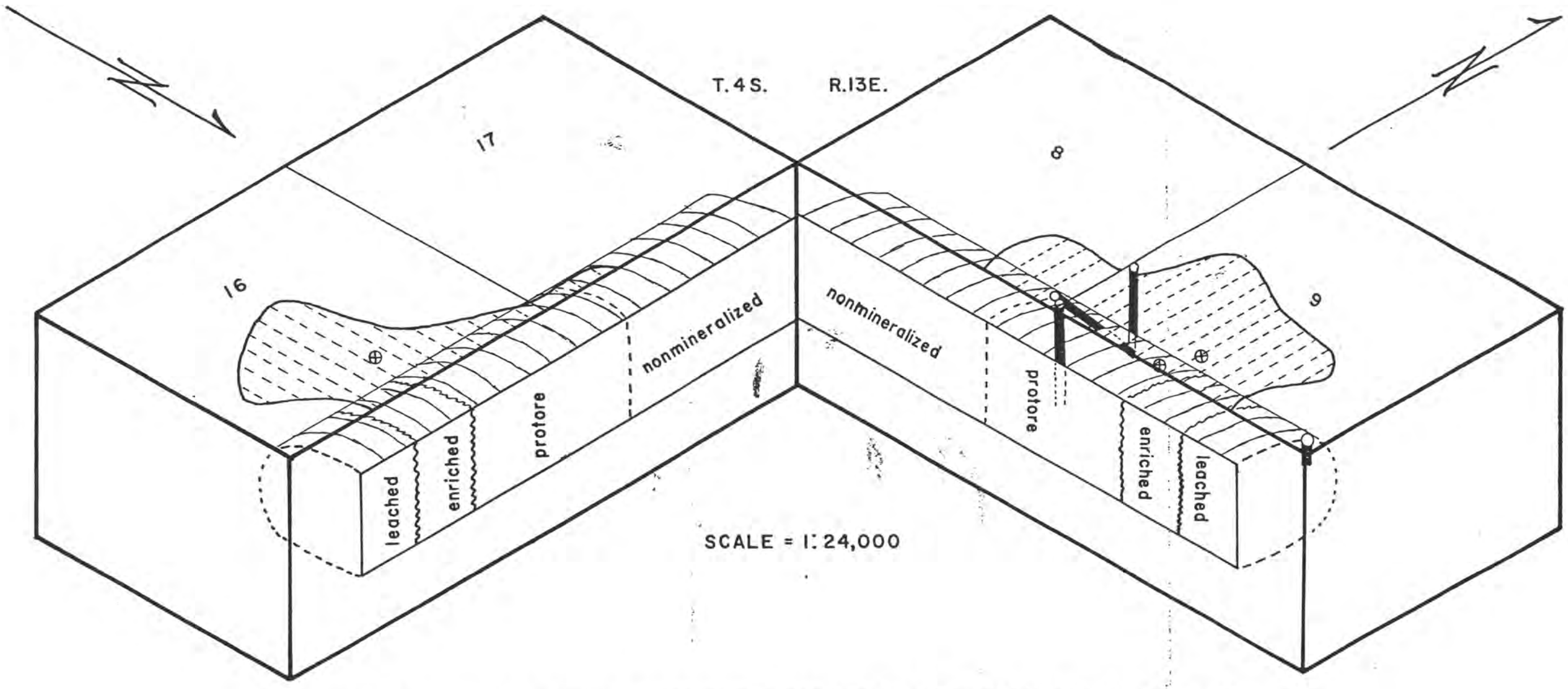
LINE DRAWING OF OUTCROP FOUR MILES
EAST-NORTHEAST OF CSMC DRILLHOLE J-1

Gently dipping Gila Conglomerate of upper Tertiary to Quaternary age unconformably overlies steep easterly dipping Hackberry Formation of middle miocene age (20-24 mybp). Fault in the Hackberry Formation is terminated at the unconformity.

TITLE KELVIN PROSPECT-PINAL CO., ARIZONA

SKETCH NO. FIGURE 4

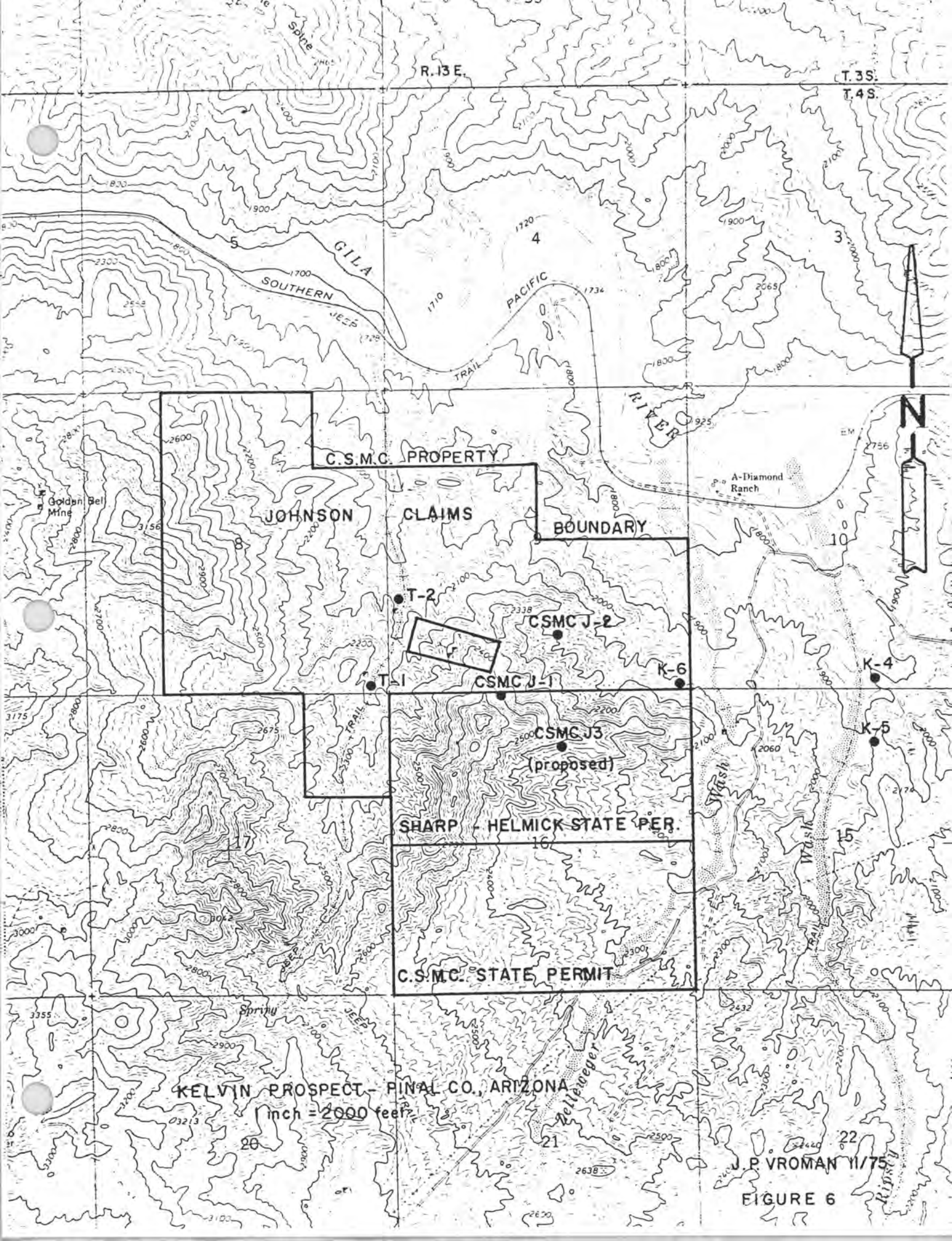
KELVIN PROSPECT - PINAL COUNTY, ARIZONA



ISOMETRIC DIAGRAM SHOWING HYPOTHESIZED TARGET AT THE KELVIN PROSPECT - A CYLINDRICAL BODY OF LARAMIDE AGE QUARTZ MONZONITE HAS BEEN ROTATED TO THE EAST 60°-90° SINCE EMPLACEMENT AND IS PRESENTLY SURROUNDED BY THE ORACLE GRANITE OF PRECAMBRIAN AGE. INDUCED POLARIZATION ANOMALY ON THE SURFACE (red) INDICATES UNDERLYING SULFIDE ZONE. PAST DEEP DRILLING HAS BEEN TOO FAR WEST TO TEST THE MOST FAVORABLE PORTION OF THE TARGET. PROPOSED C.S.M.C. DRILLING SITES = ⊕.

FIGURE 5

J.P.V. 1 FEB 74



KELVIN PROSPECT - PINAL CO., ARIZONA

1 inch = 2000 feet

J.P. VROMAN 11/75

FIGURE 6

PROJECT Kelvin DRILL HOLE NO. J-1 SCALE 1" = 400' PAGE NO. 1 OF 1

LENGTH	% Cu	PPM Mo	weight % sulfide	Py/Cp
200	.083	17	.24	
			.88	
400	.035	17	.41	
600	.098	19	.77	
800	.035	12	.30	
1000	.022	8	.33	2.01
1200	.080	7	.70	
1400	.056	9	.67	
1600	.029	8	.21	
1800	.197	26	.95	0.96
	.041	14	.75	
2000	.661	9	2.76	0.64
	.219			
2200	.004		.12	0.98
	.022	8		
2400	.140	52	.65	2.40
			1.99	

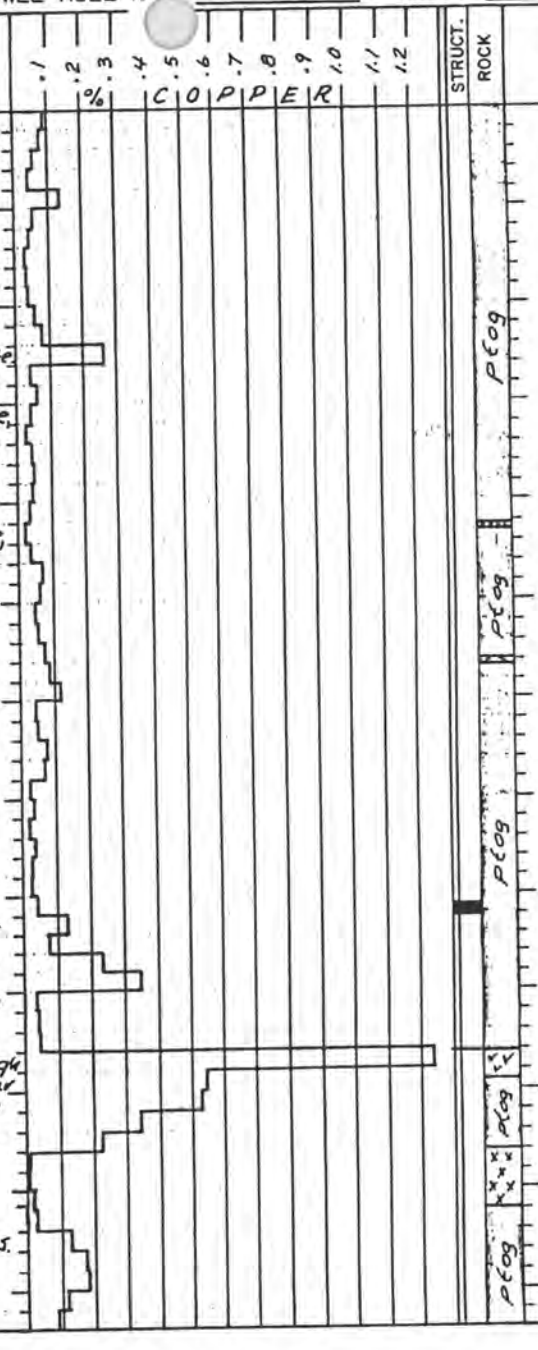
11-2478 = NX wireline core

Summary Alteration Log

0-1640: alteration is variable and ranges from deuteric to phyllic. Overall the alteration assemblage appears to conform to the "outer deep level" of Lowell & Guilbert. K-feldspar is generally fresh but may be "dusted" with a trace of sericite. Plagioclase is generally altered to a sericite-clay mixture ± minor carbonate. Biotite is commonly altered to chlorite ± magnetite and occasionally to magnetite, epidote and minor carbonate. Pyrite is more common than chalcopyrite & occurs in veinlets more often than as disseminations. Veinlets of sulfide, chlorite, carbonate, quartz, epidote & magnetite occur sporadically.

1640-2478: Phyllic-moderate to strong, generally a mixture of quartz and sericite with sulfides. Plagioclase is completely altered to sericite. K-feldspar is generally altered to sericite although patches of primary K-spar remain. Quartz has been added in veins & veinlets. Total sulfides increase by a factor of 2.5x. Chalcopyrite is more common than pyrite in veins & veinlets more common than disseminations.

2478' is total length



Summary Lithologic L

0-851: Precambrian Oracle Granite: porphyritic quartz monzonite with numerous pink to red perthitic K-feldspar phenocrysts measuring up to 1 inch in diameter. Together with somewhat smaller plagioclase grains they are surrounded by a medium grained quartz - plagioclase K-feldspar matrix.

851-856: Precambrian (?) diabase

856-1120: Precambrian Oracle Granite

1120-1128: Tertiary-Cretaceous (?) Quartz Latite Porphyry: phenocrysts of quartz and feldspar in a fine-grained gray groundmass composed of quartz, K-feldspar, chlorite and carbonate.

1128-1932: Precambrian Oracle Granite with minor dikes of Precambrian (?) aplite.

1932-1983: Tertiary-Cretaceous Quartz Monzonite Porphyry: quartz and feldspar phenocrysts with abundant mafic minerals in a matrix of K-feldspar & minor quartz. Upper contact is a fault with probable major movement.

1983-2123: Precambrian Oracle Granite

2123-2240: Tertiary-Cretaceous Quartz Monzonite Porphyry: phenocrysts of quartz, muscovite and feldspar in a fine grained matrix of clay, sericite, quartz and carbonate. Probably a different intrusive than 1932-1983 above.

2240-2478: Precambrian Oracle Granite.

FIGURE 7

KELVIN PROSPECT - PINAL CO., ARIZONA
C.S.M.C. DRILLHOLE J-1

J.P. VROMAN 11/75

DRILL HOLE RECORD

PROJECT Kelvin DRILL HOLE J-2 SCALE 1" = 400' PAGE NO. 1 OF 1

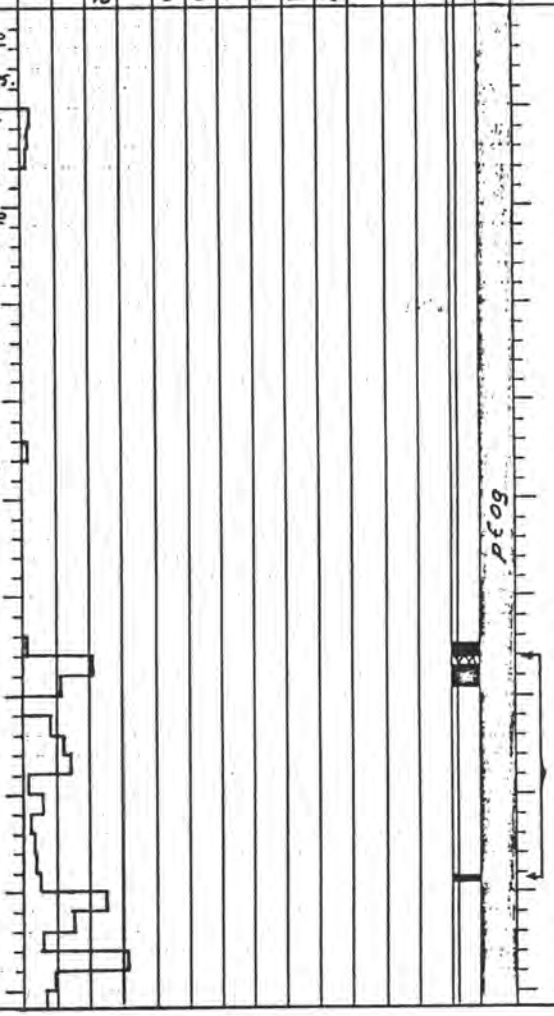
LENGTH	ASSAYS % Cu	PPM Mo	wt. % sulfide	py/cp
200	.0035	3	.10	
	.0110	4	1.62	
400	.0022	1		
600	.0026	4		
800			.07	13.6
	.0052	1		
1000	.0039			
1200		<1		
	.0037			
1400	.1594			1.29
	.0749		.72	
1600		10		
	.0443			8.18
1800	.1662	29	1.38	1.63
2000				

40 - 2018 = NX wireline core

Summary Alteration Log

0-2018: alteration is variable and generally increases in or near known sheared zones. Overall the alteration assemblage appears to conform to the "outer deep level" of Lowell & Guilbert. K-feldspar is generally fresh but may be "dusted" with a trace of sericite. Plagioclase is generally altered to a sericite-clay mixture ± minor carbonate. Biotite is commonly altered to chlorite ± magnetite and occasionally to epidote & minor carbonate. Total sulfide content is extremely low but increases by a factor of 20x ± below the fault at 1300'. Other than the marked increase in sulfides there is no distinct change in alteration from above to below the fault.

2018' is total length



fault zones where major movement is indicated.

Summary Lithologic Log

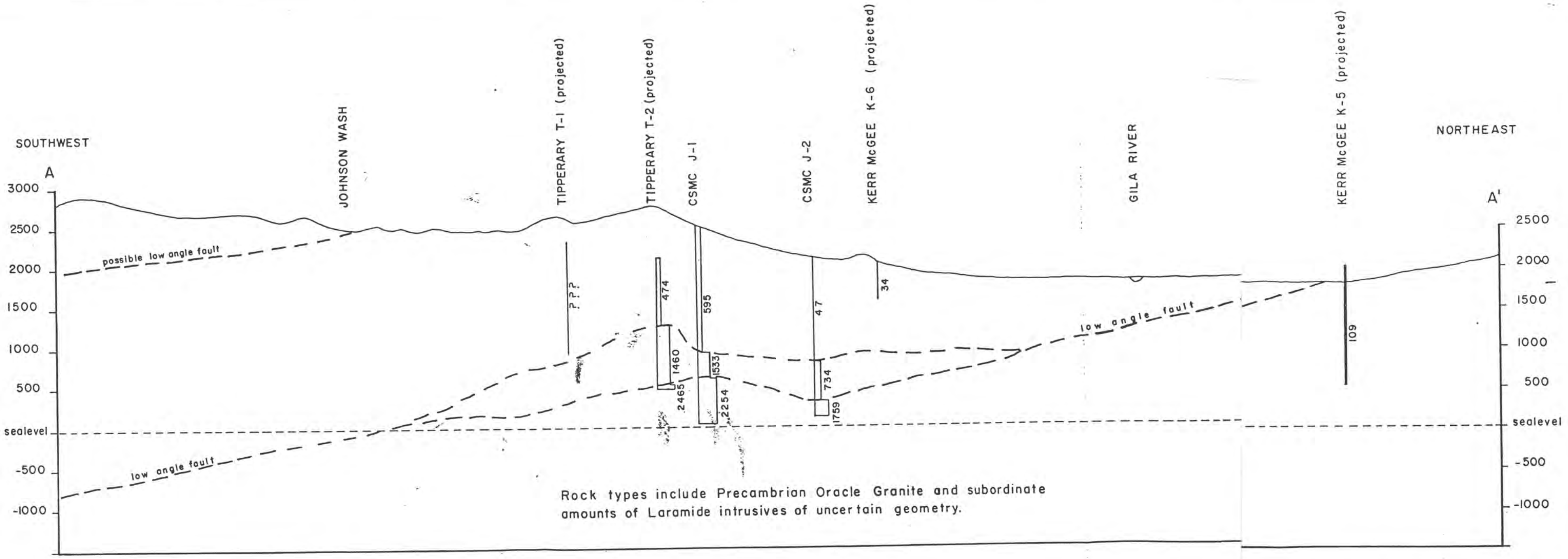
0-2018: Precambrian Oracle Granite: porphyritic quartz monzonite with numerous pink to red perthitic K-feldspar phenocrysts measuring up to 1 inch in diameter. Together with somewhat smaller plagioclase grains they are surrounded by a medium grained quartz-plagioclase K-feldspar matrix.

KELVIN PROSPECT - PINAL CO., ARIZONA

C.S.M.C. DRILLHOLE J-2

FIGURE 8

J.P. VROMAN 11/75



NOTE: numbers written vertically indicate amount of copper (ppm) within interval.

CROSS SECTION ACROSS THE KELVIN PROSPECT - PINAL COUNTY, ARIZONA

(LOOKING NORTWEST)

CITIES SERVICE MINERALS CORPORATION

KELVIN PROSPECT

PINAL CO., ARIZONA

SCALE- 1:12,000 DATE- 13 NOV 75

FILE NO.- DRAWN BY- VROMAN

FIGURE 10

GEOLOGIC MAP - KELVIN PROSPECT - PINAL CO., ARIZONA

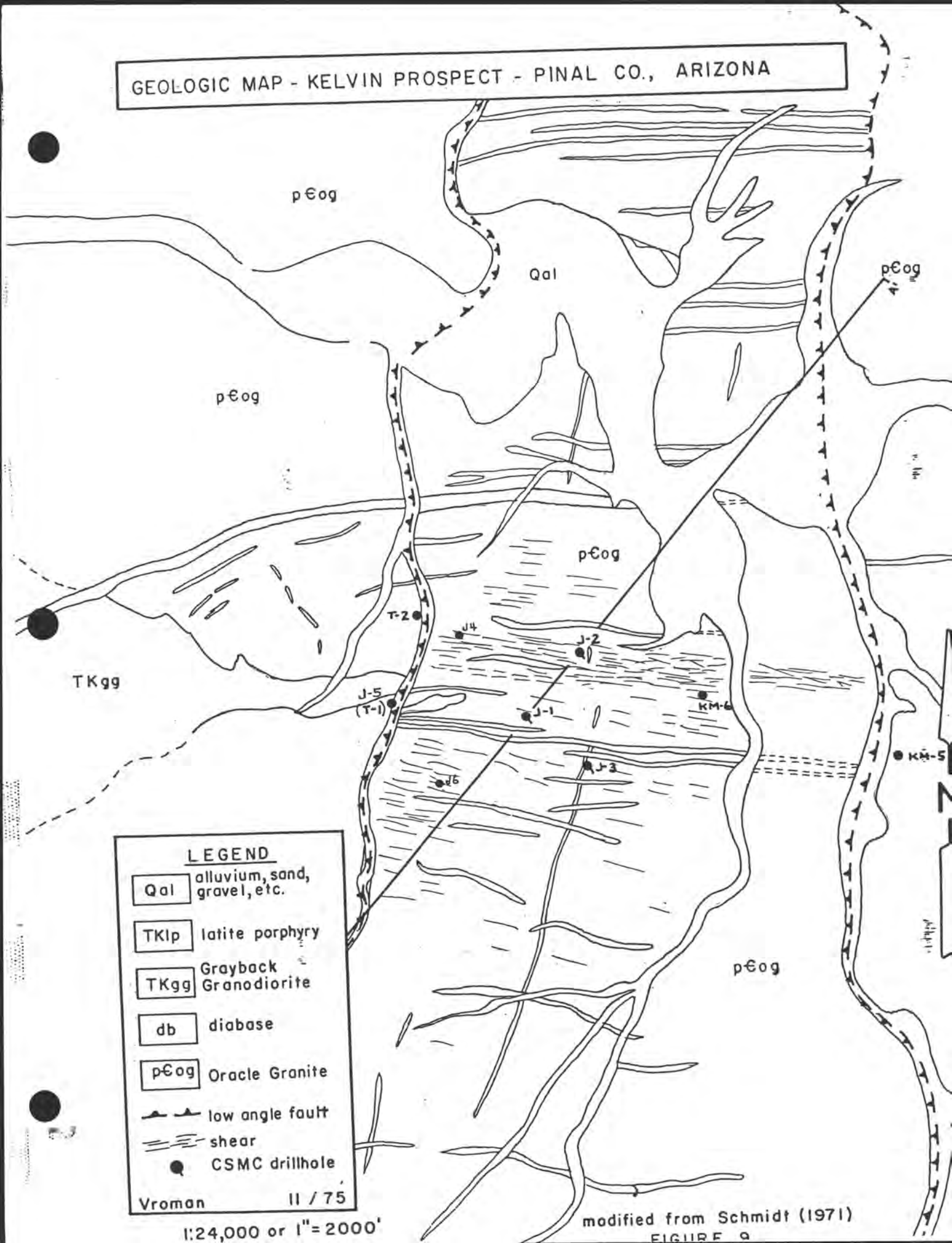


FIGURE 9

ROJECT KELVIN DRILL HOLE No. J-3 SCALE 1" = 100' PAGE NO. 1 OF 4

LENGTH	% Fe_3O_4 (comp.)	ASSAYS (%) Cu	Mo	S	weight % sulfide	Py/Cp
0-50' by casing left in hole	0.27	.048	.0002	.0063	.048	0
300	0.57	.0096	.0006	.1670	.322	10.6
600	0.69	.0055	.0001	.0328	.067	3.2

Miscellaneous

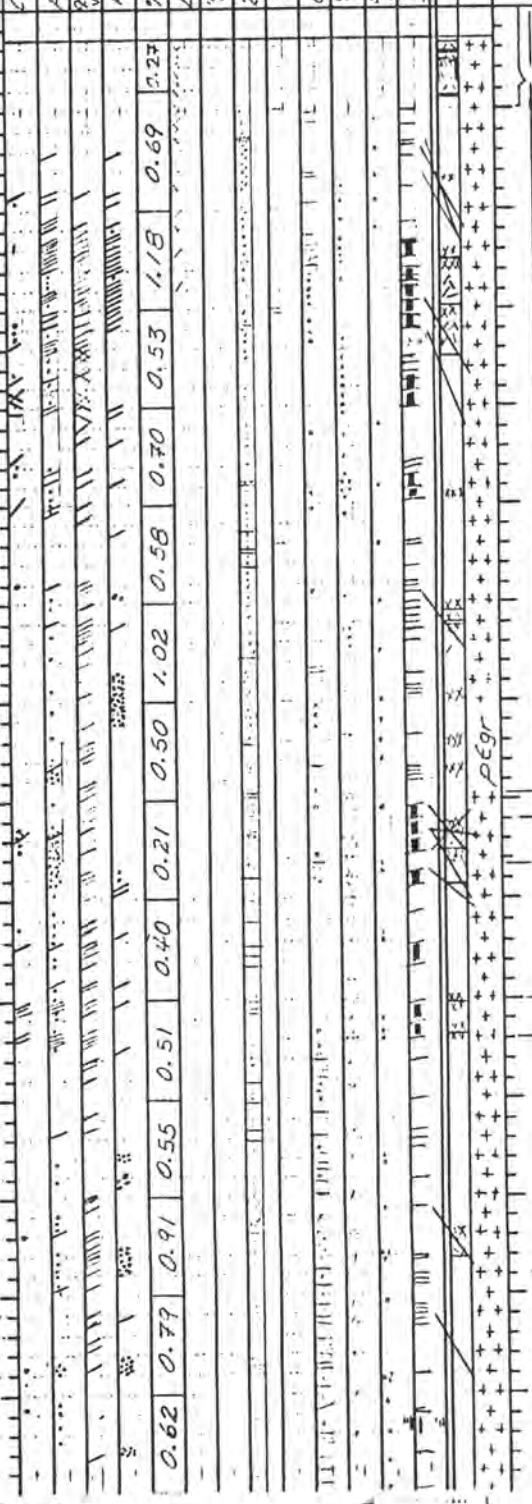
magnetite content was determined using an Elliot Geophysical Co. hand held susceptibility meter. Approximately three readings per foot were recorded and arithmetically averaged then converted to "apparent magnetite content" using graphs supplied with the instrument. The fourth column to the right illustrates the mode of occurrence, a dot for a disseminated grain(s) and a slash for veins & veinlets.

carbonate probably all calcite, was determined by applying 10% HCl along the core. Nearly all of the carbonate occurs along hairline fractures - the abundance of those fractures is illustrated by the closeness of the slashes in the ninth column to the right. Occasional veins & CO_3 replacement (alteration) of plagioclase was noted but is not recorded on this log.

all other minerals were visually estimated. In general dots represent disseminated grains and slashes represent veins & veinlets.

Potassium feldspar alteration is represented in the 13th column to the right. Open rectangles: partial alteration; solid rectangles = complete (more or less) alteration to a chlorite-sericite mixture, usually dark blue-green in color.

Plagioclase, when altered, usually alters to sericite with secondary amounts of clay and chlorite, epidote and carbonate is minor. The alteration usually results in a pale to dark green soft material. The relative intensity of this type alteration is shown in the 11th column to the right. Less commonly the plagioclase alters to white sericite shown in the 12th column to the right.



Summary Lithology Description Log

0-16' : no core - 11" surface casing

zone of oxidation - brown limonite after pyrite & magnetite common - minor Cu oxide stain on fractures

16-3004 : (unless otherwise noted): Precambrian Oracle Granite: porphyritic quartz monzonite, fresh & unaltered. Specimens contain numerous pink to red K-feldspar phenocrysts measuring up to 1.5 inches in length. Together with somewhat smaller plagioclase grains they are surrounded by a medium grained matrix composed of quartz-plagioclase & K-feldspar. Biotite is generally minor, primary muscovite is rare.

pyrite, chalcopyrite, quartz veining more common than immediately below. Magnetite occurs in veins & veinlets more commonly than as disseminations.

rock strongly broken & crushed

Plagioclase strongly altered to green sericite

possible fault zone with major movement

PROJECT Kelvin DRILL HOLE NO. J-3 SCALE 1" = 100' PAGE NO. 2 OF 4

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	weight % sulfide	Py/cp
800–900	0.45	.0036	.0001	.1326	.252	23.2
1000–1100	0.55	.0031	.0003	.0390	.076	7.5
1200–1300	0.37	.0045	.0003	.1287	.248	10.5
1400	0.40	.0066	.0002	.0253	.054	1.8

Miscellaneous

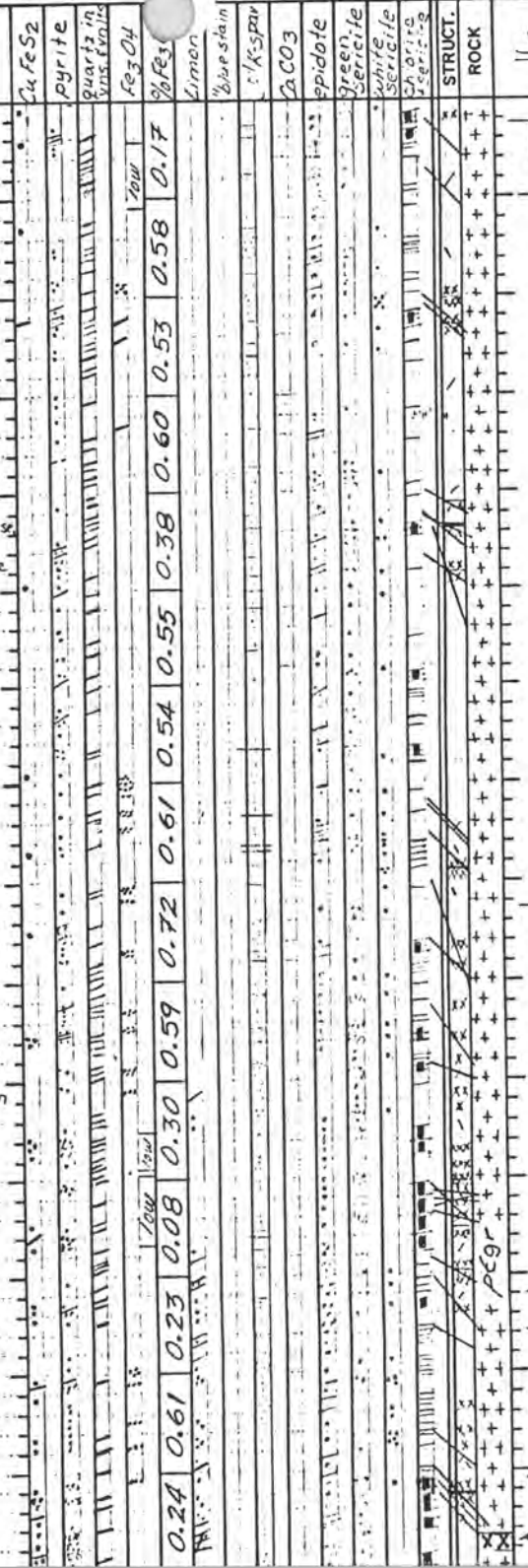
Epidote in trace amounts is common throughout the core. occassionally it is abundant, usually in the matrix of the rock, apparently as an alteration product. The relative amounts are shown in the 10th column to the right and in notes to the right of the rock column.

Secondary K-spar occurs in rare veins and veinlets throughout the length of the hole, the occurence of which is shown in the 8th column to the right. Some also occurs as minor recrystallization of primary K-spar & as rims around plagioclase.

Limonite: bright red to brown Fe oxides From surface oxidation is common at the top of the hole and decreases to nil at approximately 140'. At 1250' to the bottom of the hole it occurs along fractures and as stain on sericitized plagioclase grains (dots); sometimes it becomes intense and the relative amounts are shown in the 6th column to the right.

"Blue stain" believed to be chloritic was noted in the interval 2250'-2850'. The stain occurs along fractures, is deep blue-green in color and is shown in the 7th column to the right.

"Secondary" biotite: although not recorded on this log there generally is an abundance of black biotite associated with each high concentration of magnetic - some of the biotite may be secondary.



Summary Lithology & Alteration Log

strong epidote in matrix - marked decrease in $CaCO_3$ extremely low magnetite zone extends ± 4' above & below zone of strong epidote.

Plagioclase generally strongly altered to green seric

some of relatively strong secondary K-spar alteration of plagioclase.

1483½-1492: Laramide Quartz Latite Porphyry: upper contact @ 70° to core axis - lower @ 35°. Magnetite = 0.23% No K-spar seen. Phenocrysts of quartz and former feldspars up to 0.2" occur in a quartz-rich fine-grain groundmass. Feldspars altered to green sericite. Approx. 3 vol. % fine disseminated pyrite present. Dark gra Former biotite altered to chlorite altered to sericite

DRILL HOLE RECORD

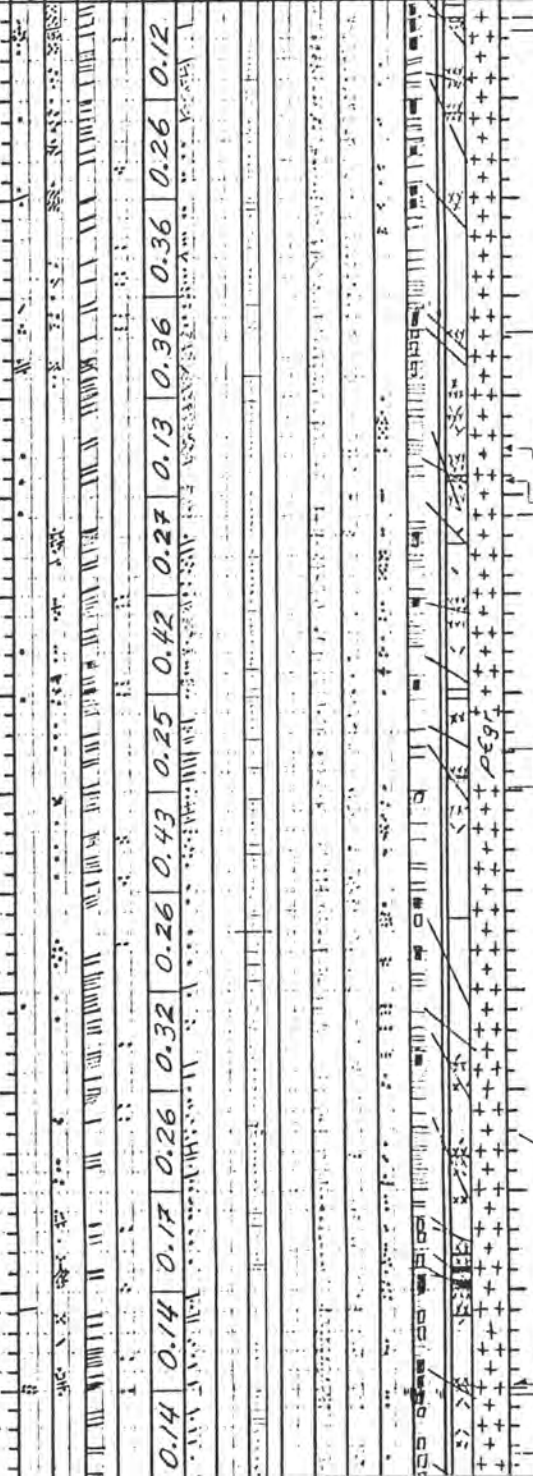
ROJECT Kelvin DRILL HOLE No. J-3 SCALE 1" = 100' PAGE NO. 3 OF 4

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	weight % sulfide	py/cp
	0.23	.0082	.0001	.3186	.604	24.5
1000						
1100	0.26	.0051	.0002	.0173	.038	1.5
1500	0.31	.0030	.0002	.0338	.066	6.7
1900						
2000	0.34	.0044	.0004	.0116	.026	1.1
2100						
2200	0.16	.0072	.0003	.0736	.145	6.0

Miscellaneous

Structure: solid horizontal lines show gouge zones. closely spaced "X's" show broken and crushed core. No notation reflects relatively solid core. Gradations are apparent. Solid lines drawn completely through the column show the orientation with respect to core axis along which slickensides were noted or there is other evidence for possible movement.

Casing left in hole:
cloth & cement plug
flange - welded to BX casing
16' NX casing
50' BX casing suspended inside NX casing



Summary Lithology & Alteration Log

- brecciated
- zone of abundant brick red limonite occurring along fractures and as stain on plagioclase phenocrysts. The red plagioclase is soft and is probably sericitized.
- speck of native copper
- iron stained calcite crystals
- strong epidote
- zone of very low magnetite, potassium feldspars generally partially altered to sericite & chlorite
- possible "healed" fault
- strong epidote

ROJECT KELVIN DRILL HOLE NO SCALE

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	weight % sulfide	py/cp
2300	0.30	.0382	.0003	.8045	1.543	13.0
2400	0.74	.0030	.0004	.0259	.052	4.9
2700	0.28	.0162	.0005	.2877	.554	8.7
2900	0.89	.0029	.0005	.0259	.052	5.1
3000						

Miscellaneous

Drilling & Cost Data:
date started: 5 MAR 1976
date completed: 8 MAY 1976
total length: 3004 feet
core size: NX wireline
collar location: approximately 1000' FNL & 2300' FEL, sec 16, T.4S., R.11E., Pinal Co., Ariz.
collar elevation: ~2370'
inclination: -90°

average footage per shift = 18.3
direct drilling cost = 12.49/foot
mud, H_2O, etc. = 1.29/foot
assaying = 0.71/foot
splitting = 0.32/foot
thin sections = 0.05/foot
TOTAL = 14.86/foot

drilling contractor: JOY MANUFACTURING CO.

Logged by: J.P. VROMAN

% Fe_3O_4	Limit
0.25	
0.41	
0.20	
0.73	
0.78	
0.72	
1.08	
0.85	
0.49	
0.41	
0.19	
0.27	
0.28	
0.90	
0.76	

Summary Lithology & Alteration Log

2253.3-2254.5: Laramide Quartz Latite Porphyry - upper contact at 70° to core axis - lower contact at 45°. Chilled margin at upper contact not evident at lower. epidote and pyrite common. Lower portion brecciated.

2291-2297: brecciated and rehealed fault (?) zone.

zone of high pyrite, strongest chalcopyrite in hole. quartz veins & veinlets common, carbonate decreased, feldspars generally altered to sericite with some chlorite.

2461-2461.5: Laramide Quartz Latite Porphyry upper contact @ 42° to core axis; lower at 39°
2462.5-2463.2: Laramide Quartz Latite Porphyry upper contact at 43° to core axis; lower at 45°

visible MoS_2 in quartz vein (2470-2480 = 38 ppm Mo)

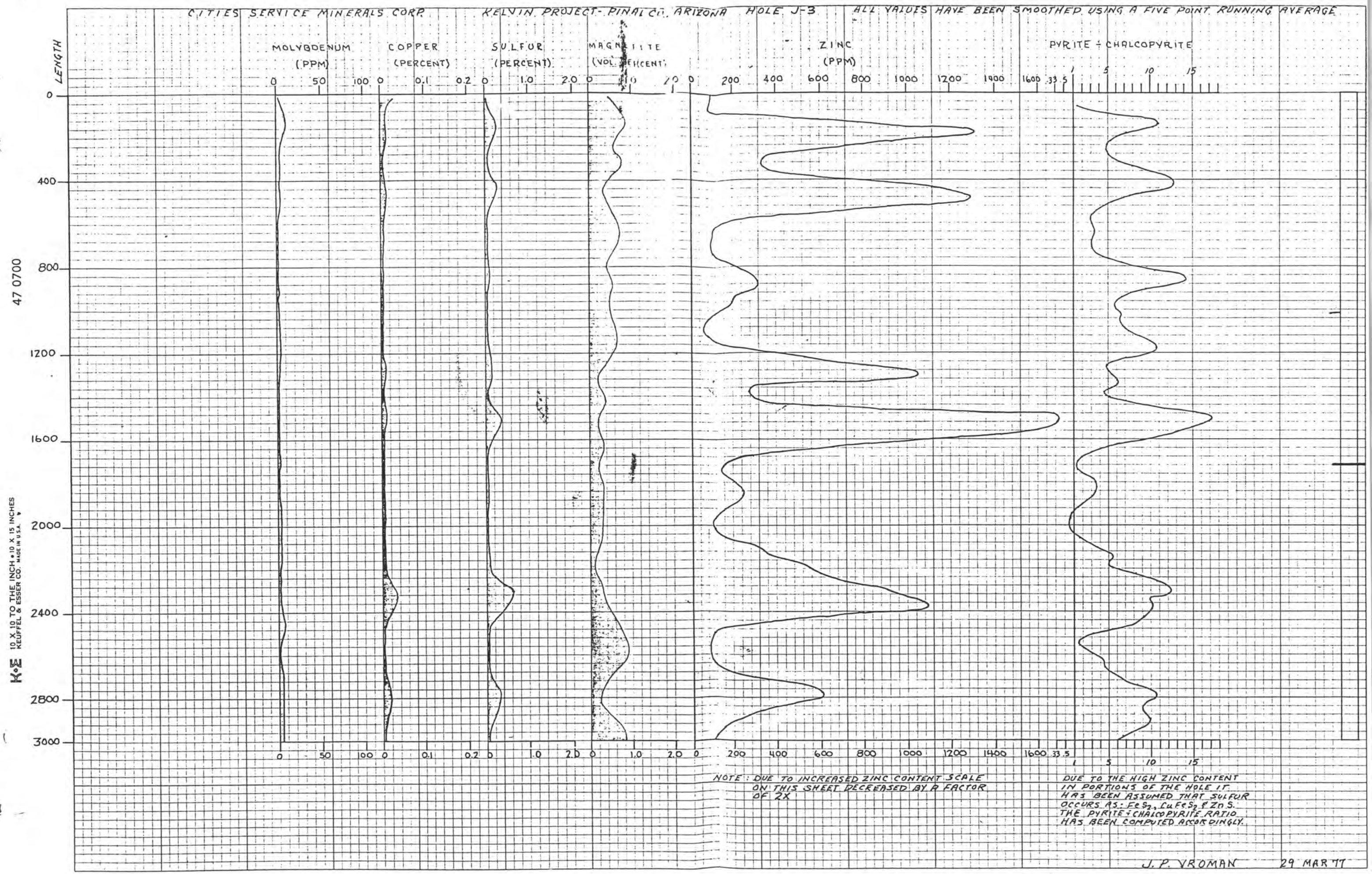
2395'-2745': relatively fresh Oracle Granite

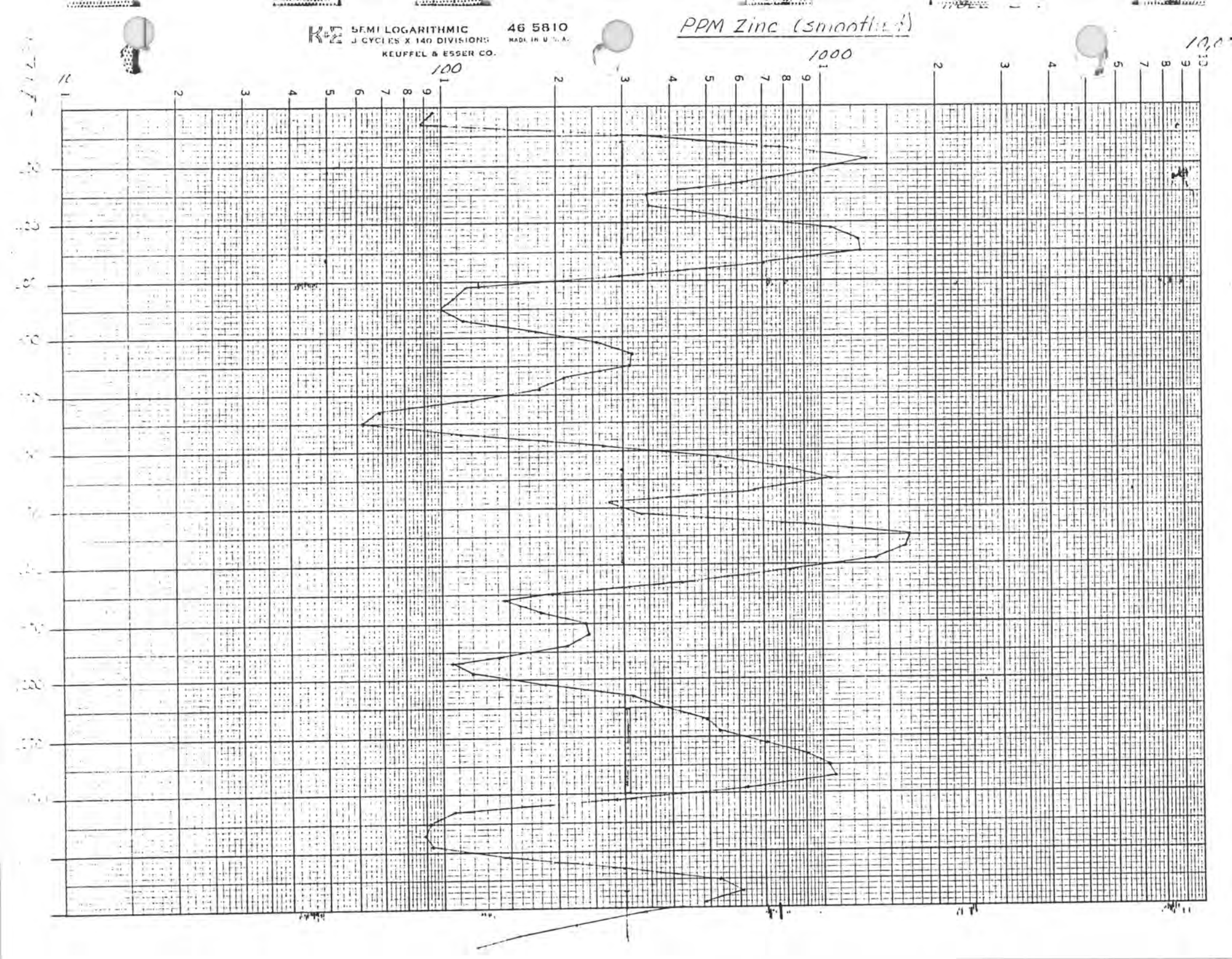
rehealed breccia

plagioclase completely altered to green sericite microcline generally altered to sericite and chlorite, magnetite probably destroyed, pyrite (disseminated) & qtz veinlets more common than above or below. Carbonate less abundant. Rock in general is more broken.

fresh Precambrian Oracle Granite.

3004 feet is total length


CITIES SERVICE MINERALS CORP. KELVIN PROJECT - PINAL CO. ARIZONA HOLE J-3
ALL VALUES HAVE BEEN SMOOTHED USING A FIVE POINT RUNNING AVERAGE
LENGTH
MOLYBDENUM (PPM)
COPPER (PERCENT)
SULFUR (PERCENT)
MAGNETITE (VOL. PERCENT)
ZINC (PPM)
PYRITE ÷ CHALCOPYRITE
47 0700
0
400
800
1200
1600
2000
2400
2800
3000
NOTE: DUE TO INCREASED ZINC CONTENT SCALE ON THIS SHEET DECREASED BY A FACTOR OF 2X
DUE TO THE HIGH ZINC CONTENT IN PORTIONS OF THE HOLE IT HAS BEEN ASSUMED THAT SULFUR OCCURS AS: FeS2, CuFeS2 & ZnS. THE PYRITE ÷ CHALCOPYRITE RATIO HAS BEEN COMPUTED ACCORDINGLY.
J. P. VROMAN
29 MAR 77
K+E 10 X 10 TO THE INCH • 10 X 15 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.


K+E SEMI LOGARITHMIC 46 5810
3 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
PPM Zinc (smoothed)
100
1000

HOLE J-3 PAGE 1

Footage	1 % Cu (ASSAY)	2 wt % cp (Cu x 2.8885 =)	3 % S in cp (Cu x 1.00925 =)	4 % S (ASSAY)	5 % S in py (Column 4 minus Column 3 =)	6 wt % py (% S in py x 1.871 =)	7	8 TOTAL SULFIDES (wt % py + wt % cp = wt %)	9 PPM Co	10 py/cp	11 % Zn	12 % Fe_3O_4	13 % M
0 - 40 1	.0480	.1386	.0484	.0063	.0000	.0000		.048	—	0.0		.27	[illegible]
40 - 80 2	.0050	.0144	.0050	.0179	.0129	.0241		.029	10	1.7	.0098	.73	[illegible]
80 - 120 3	.0100	.0289	.0101	.0700	.0680	.1272		.137	10	4.4	.0087	[illegible]	[illegible]
120 - 160 4	.0050	.0144	.0050	.3590	.3540	.6622		.667	22	46.	.0054	1.40	[illegible]
160 - 200 5	.0238	.0687	.0240	.3050	.2810	.5257		.550	8	7.7	.3100	.34	[illegible]
200 - 240 6	.0091	.0263	.0092	.0710	.0618	.1156		.142	10	4.4	.0262	.75	[illegible]
240 - 280 7	.0059	.0170	.0060	.0930	.0870	.1628		.169	8	9.6	.0554	.56	[illegible]
280 - 320 8	.0049	.0142	.0049	.0720	.0671	.1255		.130	10	6.9	.0415	.58	[illegible]
320 - 360 9	.0042	.0121	.0042	.0380	.0338	.0632		.067	14	5.2	.0143	1.41	[illegible]
360 - 400 10	.0058	.0168	.0059	.0670	.0611	.0327		.039	10	1.9	.0100	.19	[illegible]
400 - 440 11	.0147	.0425	.0148	.5190	.5042	.9433		.958	16	22.	.1775	.15	[illegible]
440 - 480 12	.0056	.0162	.0057	.1050	.0993	.1858		.192	10	11	.0706	.49	[illegible]
480 - 520 13	.0210	.0607	.0212	.2780	.2568	.4804		.503	10	6.0	.2400	.34	[illegible]
520 - 560 14	.0057	.0165	.0058	.0370	.0312	.0584		.064	10	[illegible]	.0179	.52	[illegible]
560 - 600 15	.0049	.0142	.0049	.0120	.0071	.0133		.018	8	[illegible]	.0075	.60	[illegible]
600 - 640 16	.0067	.0194	.0068	.0610	.0542	.1014		.108	12	5.2	.0128	[illegible]	[illegible]
640 - 680 17	.0046	.0133	.0046	.0350	.0304	.0569		.070	8	[illegible]	.0126	.50	[illegible]
680 - 720 18	.0063	.0182	.0064	.0350	.0286	.0535		.072	10	2.9	.0083	.14	[illegible]
720 - 760 19	.0046	.0133	.0046	.0170	.0124	.0232		.036	8	1.7	.0061	.61	[illegible]
760 - 800 20	.0052	.0150	.0052	.0810	.0758	.1418		.157	8	9.5	.0201	.10	[illegible]
800 - 840 21	.0029	.0084	.0029	.0270	.0241	.0451		.054	8	5.4	.0188	.53	[illegible]
840 - 880 22	.0040	.0116	.0040	.1977	.1937	.3624		.374	10	31.	.0482	[illegible]	[illegible]
880 - 920 23	.0030	.0087	.0030	.0260	.0230	.0430		.052	8	4.9	.0293	[illegible]	[illegible]
920 - 960 24	.0028	.0081	.0028	.0125	.0097	.0181		.026	10	2.2	.0061	.41	[illegible]
960 - 1000 25	.0034	.0098	.0034	.0650	.0616	.1152		.125	10	12.	.0336	.44	[illegible]
1000 - 1040 26	.0028	.0081	.0028	.0245	.0217	.0426		.049	8	5.0	.0052	.59	[illegible]
1040 - 1080 27	.0036	.0104	.0036	.0555	.0519	.0961		.108	8	9.3	.0044	.43	[illegible]
1080 - 1120 28	.0029	.0084	.0029	.0335	.0306	.0572		.066	10	6.8	.0047	.79	[illegible]
1120 - 1160 29	.0030	.0087	.0030	.0145	.0115	.0215		.030	8	2.5	.0048	.52	[illegible]
1160 - 1200 30	.0037	.0107	.0037	.1420	.1383	.2587		.269	12	24.	.0241	.70	[illegible]
1200 - 1240 31	.0042	.0121	.0042	.1135	.1093	.2045		.214	10	14.	.0553	.60	[illegible]

EFFICIENCY, LINE NO. 6636

HOLE [illegible]

footage	1 % Cu	2 wt % cp	3 % Sm cp	4 % S	5 % S in py	6 wt % py	7	8 TOTAL SULFIDES	9 PPM Co	10 Py/cp	11 % Zn	12 % Pb	13 % Mo
[illegible] -1280 1	.0160	.0462	.0161	.0720	.0559	.1046	//////	.151	//////	2.3	//////	.43	.0002
-1320 2	.0090	.0260	.0091	.2180	.2089	.3908		.417	10	15.	.2200	.11	.0003
-1360 3	.0047	.0136	.0047	.0978	.0931	.1742		.188	8	13.	.0292	.13	.0002
-1400 4	.0036	.0104	.0036	.0163	.0127	.0238		.034	6	2.3	.0056	.24	.0002
-1440 5	.0044	.0127	.0044	.0277	.0233	.0436		.056	8	3.4	.0045	.64	.0002
-1480 6	.0117	.0338	.0118	.0316	.0198	.0370		.071	8	1.1	.0083	.33	.0002
-1520 7	.0143	.0413	.0144	.8700	.8556	1.6007		1.642	16	39.	.3400	.14	.0002
-1560 8	.0082	.0237	.0083	.1100	.1017	.1903		.214	8	8.0	.0950	.13	.0002
560 -1600 9	.0066	.0191	.0067	.2100	.2033	.3804		.400	8	20.	.1950	.20	.0001
-1640 10	.0034	.0098	.0034	.0765	.0731	.1368		.147	8	14.	.0602	.34	.0002
-1680 11	.0033	.0095	.0033	.0135	.0102	.0191		.029	8	2.0	.0244	.49	.0001
-1720 12	.0074	.0214	.0075	.0317	.0242	.0453		.067	8	2.1	.0156	.17	.0002
-1760 13	.0047	.0136	.0047	.0067	.0020	.0037		.017	8	.27	.0093	.13	.0004
1760 -1800 14	.0035	.0101	.0035	.0335	.0300	.0561		.066	10	5.6	.0114	.20	.0002
-1840 15	.0026	.0075	.0026	.0359	.0333	.0623		.070	8	8.3	[illegible]	.40	[illegible]
-1880 16	.0030	.0087	.0030	.0341	.0311	.0582		.067	10	6.7	.0211	.41	[illegible]
1920 17	.0029	.0084	.0029	.0317	.0288	.0537		.062	10	6.4	.0230	[illegible]	[illegible]
-[illegible] 18	.0077	.0222	.0078	.0093	.0015	.0028		.025	10	.13	.0066	.13	[illegible]
1760 -[illegible] 19	.0038	.0110	.0038	.0170	.0132	.0247		.036	10	2.2	.0110	[illegible]	.0004
-[illegible] 20	.0032	.0092	.0032	.0116	.0084	.0157		.025	10	1.7	.0080	[illegible]	[illegible]
-[illegible] 21	.0029	.0084	.0029	.0085	.0056	.0105		.019	8	1.2	.0073	[illegible]	[illegible]
-[illegible] 22	.0038	.0110	.0038	.0401	.0363	.0679		.079	8	6.2	.0335	[illegible]	[illegible]
-[illegible] 23	.0035	.0101	.0035	.0604	.0567	.1060		.117	10	10.	.0177	.11	[illegible]
2160 -[illegible] 24	.0127	.0367	.0128	.1610	.1482	.2773		.314	10	7.6	.0896	.13	[illegible]
-2240 25	.0035	.0101	.0035	.0109	.0074	.0138		.024	8	1.4	.0124	.11	[illegible]
-2280 26	.0094	.0272	.0095	.1091	.0996	.1863		.214	10	6.8	.0830	.19	.000[illegible]
-[illegible] 27	.0425	.1230	.0429	1.2075	1.1646	2.1789		2.302	30	18.	.1115	.39	.0002
-[illegible] 28	.0425	.1230	.0429	.3625	.3196	.5979		.721	16	4.9	.0477	.34	.0004
2360-[illegible] 29	.0225	.0580	.0227	.6500	.6273	1.1736	//////	1.232	12	20.	.2200	[illegible]	.0003
-[illegible] 30	.0047	.0136	.0047	.0285	.0238	.0445		.058	10	3.3	.0105	.15	.0004
[illegible]-[illegible] 31	.0030	.0087	.0030	.0478	.0448	.0838		.093	10	2.6	.0173	.60	.0015

EFFICIENCY, LINE NO. 6636

HOLE J-3

Footage	1 % Cu	2 wt % cp	3 % S in cp	4 % S	5 % S in py	6 wt % py	7	8 TOTAL SULFIDES	9 PPM Co	10 Py/cp	11 % Zn	12 % Fe_2O_4	13 % Mn
2430-2510 1	.0025	.0072	.0025	.0174	.0149	.0279		.035	10	3.9	.0074	.96	.0002
-2560 2	.0030	.0087	.0030	.0032	.0002	.0004		.009	12	.05	.0087	.61	.0001
-2640 3	.0023	.0066	.0023	.0149	.0126	.0236		.030	12	3.6	.0096	1.31	.0001
-2640 4	.0026	.0075	.0026	.0218	.0192	.0359		.043	12	4.8	.0073	.33	.0001
-2680 5	.0053	.0153	.0053	.0714	.0561	.1050		.120	12	6.9	.0124	.59	.0002
-2720 6	.0035	.0101	.0035	.0108	.0073	.0137		.024	10	1.4	.0093	.32	.0006
-2760 7	.0152	.0439	.0153	.1237	.1084	.2028		.247	9	4.6	.0716	.40	.0006
-2800 8	.0178	.0514	.0180	.5615	.5435	1.0168		1.068	16	20.	.0832	.20	.0005
-2840 9	.0175	.0505	.0177	.1916	.1739	.3253		.376	11	6.4	.0395	.18	.0005
-2880 10	.0192	.0555	.0194	.2510	.2316	.4333		.489	13	7.8	.0312	.37	.0004
-2920 11	.0044	.0127	.0044	.1715	.1275	.2385		.251	12	19.	.0222	.42	.0006
2960 12	.0029	.0084	.0029	.0295	.0266	.0498		.058	8	5.9	.0109	1.02	.0004
110-3004 13	.0029	.0084	.0029	.0223	.0194	.0363		.045	8	4.3	.0106	.77	.0006
14													
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AMPAD EFFICIENCY LINE NO. 6636

C.S.M.C. KELVIN PROJECT - HOLE [illegible]-3 PAGE 1 of 3

FIVE-POINT WEIGHTED ROLLING AVERAGES

Zn x .4905 — S in py + CP only — S in FeS_2, $CuFeS_2$, ZnS — Cu x 1.8363 — wt % Py x .53[illegible]

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5 Sin ZnS	6 wt % Py	7 Py/CP	8 wt % Pl	9 Pl/CP	10 wt % CP	11 wt % Py	12 wt % Mg	13 Mo
0-40 1	.0294	.0003	.0095	.0182	.0047	—	—	—	—	.0540	.0119	.467	3.0
40-80 2	.0170	.0006	.0087	.0587	.0044	.0971	2.0	.0695	1.4	[illegible]	[illegible]	.653	11.0
80-120 3	.0117	.0008	.0333	.1413	.0163	.2477	5.2	.2118	6.3	[illegible]	.1318	.792	14.2
120-160 4	.0108	.0011	.0784	.2335	.0385	.4160	13.3	.3444	11.0	[illegible]	[illegible]	.883	16.0
160-200 5	.0136	.0008	.1315	.2298	.0645	.4041	10.3	.2836	7.2	[illegible]	[illegible]	.721	14.[illegible]
200-240 6	.0111	.0005	.0980	.1523	.0481	.2640	8.2	.1740	5.4	[illegible]	.1434	.648	12.[illegible]
240-280 7	.0077	.0004	.0619	.0952	.0304	.1635	7.4	.1067	4.8	.0141	[illegible]	.593	10.4
280-320 8	.0054	.0004	.0548	.0685	.0171	.1181	7.6	.0859	5.5	.0099	[illegible]	.750	12.3
320-360 9	.0057	.0004	.0353	.0938	.0173	.1647	10.0	.1324	8.0	.0105	[illegible]	.775	13.1
360-400 10	.0074	.0004	.0567	.1679	.0278	.2002	14.6	.2481	11.6	.0136	[illegible]	.515	10.3
400-440 11	.0102	.0003	.1064	.2636	.0522	.4139	16.1	.3762	12.8	.0187	[illegible]	.347	1.3
440-480 12	.0113	.0004	.1256	.2323	.0616	.4133	12.7	.2980	9.1	.0208	.2199	.352	8.9
480-520 13	.0122	.0004	.1270	.1805	.0623	.3147	6.9	.1981	5.6	.0224	.1674	.419	12.2
520-560 14	.0091	.0003	.0704	.0939	.0345	[illegible]	6.0	.0939	3.6	.0167	.0843	.527	9.4
560-600 15	.0067	.0002	.0294	.0513	.0144	[illegible]	4.5	.0564	2.9	.0123	.0443	.635	[illegible]
600-640 16	.0056	.0001	.0116	.0398	.0057	.0637	4.0	.0532	3.3	.0103	.0740	.732	11.6
640-680 17	.0055	.0001	.0108	.0378	.0053	.0603	3.3	.0504	3.2	.0101	.0521	.722	11.5
680-720 18	.0055	.0001	.0100	.0364	.0049	.0577	3.6	.0485	3.1	.0101	[illegible]	.675	11.1
720-760 19	.0050	.0001	.0113	.0381	.0055	.0618	4.3	.0516	3.6	.0092	[illegible]	[illegible]	5.9
760-800 20	.0045	.0001	.0178	.0592	.0087	.1023	7.9	.0860	6.6	.0083	[illegible]	.416	7.2
800-840 21	.0038	.0001	.0257	.0780	.0126	.1289	10.6	.1152	10.5	.0070	[illegible]	[illegible]	5.0
840-880 22	.0035	.0001	.0317	.0955	.0155	.1721	17.0	.1431	14.2	.0064	.0916	[illegible]	[illegible]
880-920 23	.0032	.0002	.0311	.0656	.0153	.1167	12.6	.0891	9.5	.0059	.0621	.550	1.3
920-960 24	.0030	.0001	.0210	.0437	.0103	.0761	8.3	.0569	6.6	.0055	[illegible]	.492	8.2
960-1000 25	.0031	.0002	.0181	.0398	.0089	[illegible]	7.4	.0520	5.8	.0057	[illegible]	.484	7.9
1000-1040 26	.0031	.0003	.0116	.0408	.0057	.0705	7.9	.0599	6.7	.0057	[illegible]	[illegible]	[illegible]
1040-1080 27	.0032	.0004	.0069	.0385	.0034	.0660	7.1	.0597	6.5	[illegible]	.0351	[illegible]	9.[illegible]
1080-1120 28	.0031	.0004	.0062	.0419	.0030	.0725	8.1	.0670	7.5	.0054	[illegible]	.622	10.0
1120-1160 29	.0033	.0004	.0112	.0591	.0055	.1044	11.0	.0941	9.9	[illegible]	[illegible]	.623	10.[illegible]
1160-1200 30	.0045	.0004	.0264	.0923	.0129	.1642	12.6	.1401	10.8	.0143	.0874	.622	10.[illegible]
1200-1240 31	.0071	.0004	.0528	.1109	.0259	.1741	9.5	.1456	7.1	.0130	.1033	.540	9.[illegible]

AMPAD EFFICIENCY, LINE NO. 6636

C.S.M.C. KELVIN PROJECT - HOLE J-3

FIVE POINT WEIGHTED ROHNING AVERAGES

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5 S in ZnS (Zn × .4905)	6 int % py	7 py/cp	8 est % py	9 py/cp	10 est % cp	11 est % py	12 [illegible]	13 [illegible]
1240-1280 1	.0098	.0003	.0822	.1226	.0403	.2109	7.5	.1355	4.8	.0180	.1122	.593	7.3
1280-1320 2	.0088	.0003	.1048	.1330	.0514	.2322	9.1	.1360	5.4	.0162	.1235	.236	5.6
1320-1360 3	.0063	.0002	.0965	.0994	.0326	.1741	9.6	.1132	6.2	.0116	.0926	.213	4.8
1360-1400 4	.0051	.0002	.0275	.0544	.0135	.0922	6.3	.0670	4.5	.0094	.0491	.304	5.4
1400-1440 5	.0067	.0002	.0333	.0962	.0163	.1674	8.6	.1369	7.1	.0123	.0891	.315	7.5
1440-1480 6	.0097	.0002	.0904	.2290	.0443	.4101	14.6	.3272	11.7	.0178	[illegible]	.335	8.6
1480-1520 7	.0109	.0002	.1700	.3856	.0834	.7008	22.3	.5448	17.3	.0200	.3723	.232	9.4
1520-1560 8	.0091	.0002	.1653	.2999	.0811	.5439	20.7	.3922	14.9	.0167	.2824	.203	7.6
1560-1600 9	.0066	.0002	.1388	.1918	.0681	.3464	18.2	.2191	11.5	.0121	.1843	.272	7.0
1600-1640 10	.0048	.0002	.0822	.0919	.0404	.1629	11.7	.0874	6.3	.0088	.0874	.336	6.5
1640-1680 11	.0046	.0002	.0426	.0468	.0209	.0759	5.9	.0399	3.0	.0084	.0420	.339	5.8
1680-1720 12	.0052	.0003	.0193	.0253	.0095	.0345	2.5	.0198	1.3	.0075	.0200	.254	4.3
1720-1760 13	.0048	.0002	.0144	.0214	.0071	.0310	2.2	.0178	1.3	.0068	.0164	.225	3.4
1760-1800 14	.0038	.0002	.0181	.0319	.0089	.0525	4.8	.0359	3.3	.0040	.0279	.273	4.7
1800-1840 15	.0031	.0002	.0238	.0324	.0117	.0548	6.1	.0329	3.7	[illegible]	[illegible]	.334	5.6
1840-1880 16	.0033	.0002	.0242	.0320	.0119	.0526	5.6	.0314	3.3	[illegible]	.0285	.344	[illegible]
1880-1920 17	.0041	.0003	.0211	.0263	.0103	.0415	3.5	.0223	1.9	.0075	.0221	[illegible]	5.1
1920-1960 18	.0050	.0004	.0140	.0183	.0069	.0248	[illegible]	.0120	.83	.0092	.0132	.332	5.3
1960-2000 19	.0044	.0004	.0104	.0145	.0051	.0188	1.5	.0094	.74	[illegible]	.0100	.315	5.0
2000-2040 20	.0037	.0004	.0120	.0141	.0059	.0194	1.8	.0084	.79	[illegible]	.0103	.308	4.9
2040-2080 21	.0033	.0004	.0185	.0212	.0091	.0324	2.5	.0165	1.7	[illegible]	.0177	[illegible]	[illegible]
2080-2120 22	.0042	.0004	.0316	.0446	.0155	[illegible]	[illegible]	.0466	3.8	[illegible]	.0402	.224	4.1
2120-2160 23	.0056	.0004	.0375	.0711	.0184	[illegible]	7.6	.0891	5.4	.0103	.0651	.158	3.5
2160-2200 24	.0075	.0003	.0496	.0899	.0243	.1540	7.1	.1086	5.0	.0139	.0919	.132	3.4
2200-2240 25	.0100	.0002	.0538	.1641	.0264	[illegible]	10.0	.2384	8.3	[illegible]	[illegible]	.154	[illegible]
2240-2280 26	.0185	.0002	.0711	.3634	.0349	.6450	[illegible]	.5797	10.8	[illegible]	.3421	[illegible]	9.0
2280-2320 27	.0303	.0002	.0909	.6541	.0446	1.1665	13.3	1.0831	12.4	.0550	.6206	[illegible]	4.0
2320-2360 28	.0324	.0003	.1020	.5734	.0500	1.0215	10.9	.9280	9.9	.0503	.5134	.342	14.2
2360-2400 29	.0230	.0004	.1080	.4368	.0530	.7738	[illegible]	.6746	10.2	.0422	.4117	.412	[illegible]
2400-2440 30	.0112	.0006	.0620	.2012	.0309	.3553	11.0	.2975	9.2	.0206	[illegible]	[illegible]	[illegible]
2440-2480 31	.0048	.0004	.0335	.0792	.0140	.1391	10.0	.1130	8.0	[illegible]	.0740	[illegible]	[illegible]

AMPAD EFFICIENCY LINE NO. 6636

C.S.M.C. KEWIN PROJECT - HOLE J-3 PAGE 3 of 3

FIVE POINT WEIGHTED RUNNING AVERAGES

Zn x .4905

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5 S in ZnS	6 wt % py	7 py/cp	8 wt % py	9 py/cp	10 wt % Cu	11 wt % py	12 wt % Mo	13 Mo
2480-2520 1	.0029	.0005	.0104	.0218	.0051	.0354	4.2	.0258	3.1	.0053	.0188	.799	12.3
2520-2560 2	.0027	.0002	.0092	.0140	.0045	.0211	2.7	.0127	1.6	.0050	.0112	.845	12.9
2560-2600 3	.0028	.0001	.0089	.0183	.0044	.0290	3.6	.0208	2.6	.0051	.0154	.910	14.0
2600-2640 4	.0033	.0002	.0093	.0294	.0046	.0488	5.1	.0402	4.2	.0061	.0260	.801	12.5
2640-2680 5	.0048	.0003	.0148	.0456	.0073	.0763	5.5	.0627	4.5	.0088	.0406	.628	10.2
2680-2720 6	.0076	.0005	.0299	.0940	.0146	.1615	7.4	.1342	6.1	.0140	.0859	.487	8.8
2720-2760 7	.0125	.0005	.0529	.1999	.0259	.3504	9.7	.3019	8.4	.0230	.1864	.372	11.8
2760-2800 8	.0161	.0005	.0608	.3089	.0298	.5475	11.8	.4918	10.6	.0296	.2913	.279	9.0
2800-2840 9	.0168	.0005	.0488	.2839	.0239	.4994	10.3	.4547	9.4	.0308	.2657	.264	8.4
2840-2880 10	.0140	.0005	.0335	.2258	.0164	.3960	9.8	.3653	9.0	.0257	.2107	.375	9.2
2880-2920 11	.0084	.0005	.0221	.1471	.0108	.2593	10.7	.2391	9.9	.0154	.1380	.555	10.6
2920-2960 12	.0046	.0005	.0154	.0754	.0076	.1324	10.0	.1182	8.9	.0084	.0704	.753	12.5
2960-3004 13	.0031	.0005	.0120	.0413	.0059	.0715	8.0	.0604	6.7	.0057	.0380	.814	12.9
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EFFICIENCY. LINE NO. 6636

J3

* porphyry
** quartz diorite

depth		PLAGIOCLASE 1 ser.	chl.	2 epi	CO_3	3 clay	qtz	4 other	K-FELDSPAR ser.	5 chl	epi	6 CO_3	clay	7 qtz	other	BIOTITE 8 mucc	chl	9 epi	CO_3	10 [illegible]	qtz	11 other	COMMENTS 12	13
82'	1	W-M		min													min	min					opaques w/ [illegible]	
107'	2	M-S	tr	tr					min	min	min						S	S					opaques w/ [illegible]	
144'	3	S							S.							S	tr						opaques [illegible]	
280'	4	M			min											min	S	S	min				opaques w/ mafics	
344'	5	W-M				tr.											min	min						[illegible]
387'	6	W															S						coarsly brecciated	
423'	7	S	min														M		M					
479'	8	S	min			S				M		M				S							qtz-calf. veinlets	
545'	9	W-M															min	min						
668'	10	W															S	S						
671'	11																W	W						
725'	12	W				W											min	min					opaques w/ mafics	
785'	13															min	W-M	S		min				
953'	14															S	S	tr		min				
? 1177'	15	S					S		S					S		S	S							
* 1489'	16	S	min		min	S			S	min		min	S				S	S						
1673'	17	S				S			S	min		min	min			S	S							
1733'	18	M			M	S										S			min				opaques w/ mafics	
** 1813'	19	W				W										W	W							
1887'	20																min	S						
2254'	21	S				S										S								
2295'	22	S				S				M-S		M-S				S			S					
2303	23	W	S				S		W	S				S										
2334'	24	S				S			W-M	W-M		M				S			S					
2450'	25	W				tr.											W	W					opaques w/ mafics	
2461.5'	26	S			M									S		S		M				opaques		
2564'	27	M															W-S	min			W-S		mg w/ mafics	
2611'	28	W															W	tr						
2649.5'	29	S			tr				M			tr				S	tr		min					
2728'	30	W															W	tr.						
2794'	31	S							M	M						S	tr		M					
2893'		S							M	tr						S	tr		M					
2947'		W															W	tr	tr					

OFFICE COPY

THE KELVIN PROSPECT

PINAL COUNTY, ARIZONA

AN EXPLORATION PROPOSAL

CITIES SERVICE MINERALS CORPORATION

JAMES P. VROMAN

JULY 1976

The Kelvin Prospect is located in the northern portion of the Tortilla Mountains and the northeastern portion of Pinal Co., Arizona. Tucson is 60 miles south of the prospect and Miami is 23 miles to the north-northeast (figure 1).

The Kelvin Prospect is situated within the Ray-Sacaton structural belt which bisects Pinal Co., Arizona (figure 2). Other features of interest within this belt include Kennecott's Ray Mine, Conoco's Poston Butte deposit and ASARCO's Sacaton Mine.

The Kelvin Prospect had been explored by several companies prior to C.S.M.C. interest in the property. During 1968-1969 Minbanco drilled nine hammer holes (total footage = 7820'). During 1969-1970 Tipperary Resources Corporation geologically mapped the prospect at a scale of 1 inch equals 200 feet; conducted a detailed induced polarization-resistivity survey and drilled two rotary holes (1400' and 1625'). During early 1972 Cyprus Mines drilled a 2500' angle core hole on the property. Kerr-McGee drilled one 500' core hole in 1973.

C.S.M.C. has controlled the property since mid-1974 until the present. To date Cities has drilled three core holes on the property (2478', 2018', and 3004'). Summary geologic logs of these three holes are presented in this report as

figures 3 through 5. Logs of holes J-1 and J-2 are at a scale of 1 inch equals 400 feet while the log of hole J-3 (completed May, 1976) is at a scale of 1 inch = 100 feet. The most significant copper mineralization encountered on the prospect by any of the drilling to date occurs in hole J-1 where 160 feet (from 1920' to 2080') of 0.661% copper was intersected.

Since the completion of hole J-3 all of the existing data from prior drilling has been reviewed and that review forms the basis for the recommendation that follows. The review indicates that there is justification for additional drilling by C.S.M.C. on the Kelvin prospect.

In figures 6-9 copper assays over 500 foot widths have been averaged and contoured. By inspection it may be seen that, in general, copper grade increases with depth and that the lateral dimensions of the copper mineralization also increases with depth. This latter aspect is clearly illustrated in figure 10 which shows the area of greater than 0.05% (500 ppm) copper mineralization systematically increasing with depth.

Assays for total sulfur were made on samples from C.S.M.C. drilling which allows for an accurate computation of total sulfides and pyrite/chalopyrite ratio in these three holes.

Figure 11 indicates that total sulfides increase to the north and that the pyrite/chalcopyrite ratio decreases (figure 12) to the west-northwest at the deepest intervals penetrated. A contour map of molybdenum values (figure 13) also indicates that the grade of that metal increases in a northerly direction.

Figure 14 summarizes all of these parameters in the interval 0'-500' elevation. The contours of copper values as well as vectors of the other parameters (drawn from C.S.M.C. hole J-1) seem to indicate that it would be reasonable to test the area northwest of C.S.M.C. hole J-1 by drilling.

It would also seem reasonable at this time to deepen hole J-2 as the log of that hole (figure 4) shows that copper, molybdenum and total weight percent sulfides are increasing and the pyrite/chalcopyrite ratio is decreasing at the bottom of the hole.

I recommend that:

1) C.S.M.C. hole J-2 be deepened to a total length of 3000 feet (present length is 2018 feet).

2) A new hole J-4 be drilled at a point approximately 850' FWL and 1400' FSL, section 9, T.4S., R.13E. to a total length of 3000 feet. It may be possible to re-enter Minbanco

hole J-2 at this location (total length is 582') but it is anticipated that this 1968 hammer hole is caved and that it will be necessary to drill a completely new hole from the surface.

Projected costs for this 4000 feet of recommended drilling will be discussed in a memorandum by R. C. Moore that is to accompany this request.

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

J. P. VROMAN 11/75

FIGURE 1

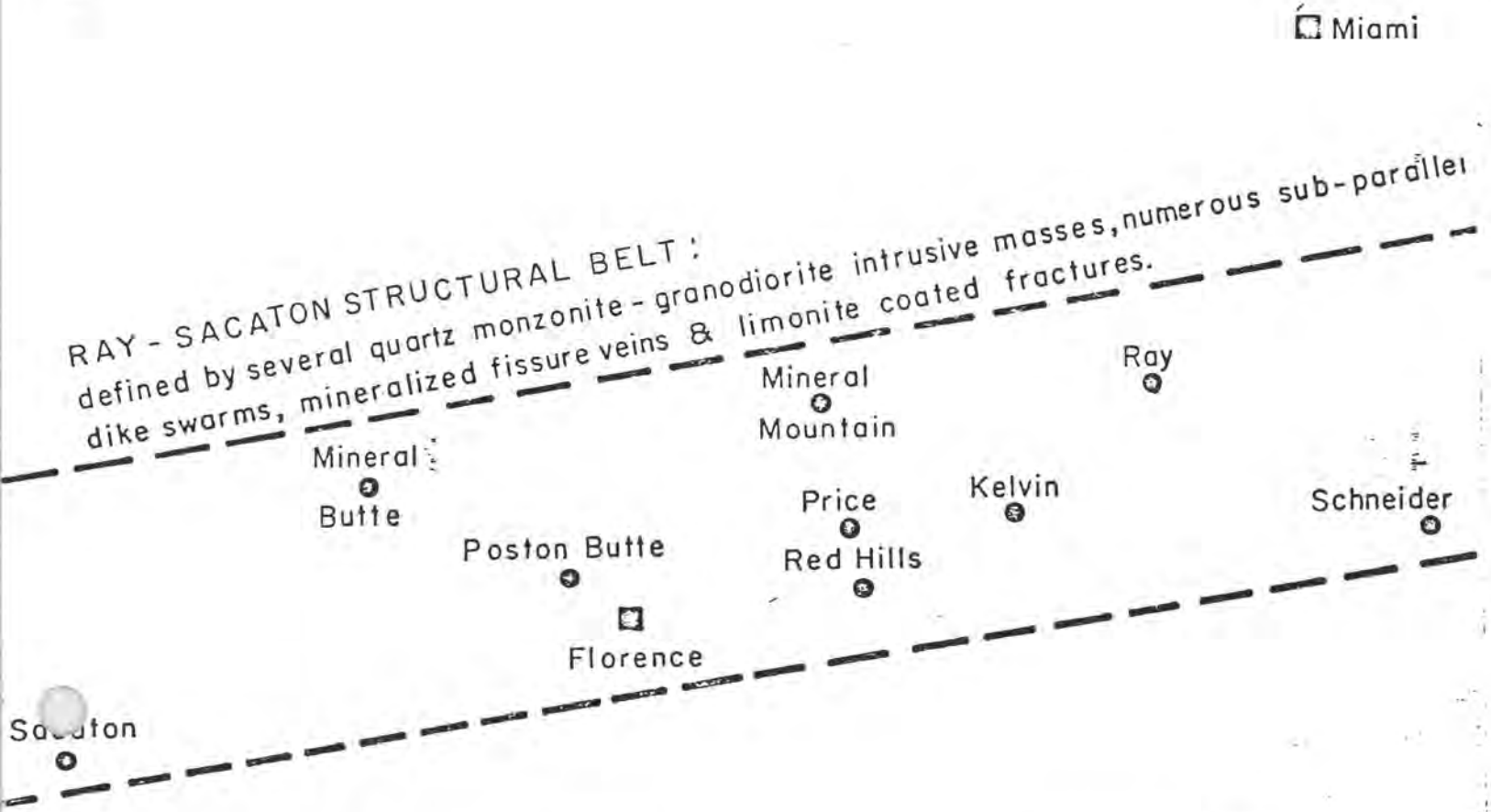
FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE 1:500,000 or

DATE 13 NOV 75

DRAWN BY J.P.V.



Major Production

Ray
Sacaton

Minor Production

Red Hills

Drilled By Cities Sub-marginal

Schneider

Major Developing

Poston Butte

Prospects

Kelvin
Price
Mineral Butte
Mineral Mountain

N

TITLE LOCATION MAP - KELVIN PROSPECT: PINAL CO., ARIZONA

SKETCH NO. FIGURE 2

DRILL HOLE RECORD

PROJECT Kelvin DRILL HOLE J-1 SCALE 1" = 400' PAGE NO. 1 OF 1

LENGTH	% Cu	PPM Mo	weight % sulfide	Py/Cp
	.083	17	.24	
			.88	
200	.035	17	.41	
400	.098	19	.77	
600	.035	12	.30	
800	.022	8	.33	2.01
1000	.080	7	.70	
1200	.056	9	.67	
1400	.029	8	.21	
1600	.197	26	.95	
1800	.041	14	.75	0.96
2000	.661		2.76	0.64
	.219	9		
2200	.004		.12	0.98
	.022	8		
2400	.140	52	.65	2.40
			1.99	

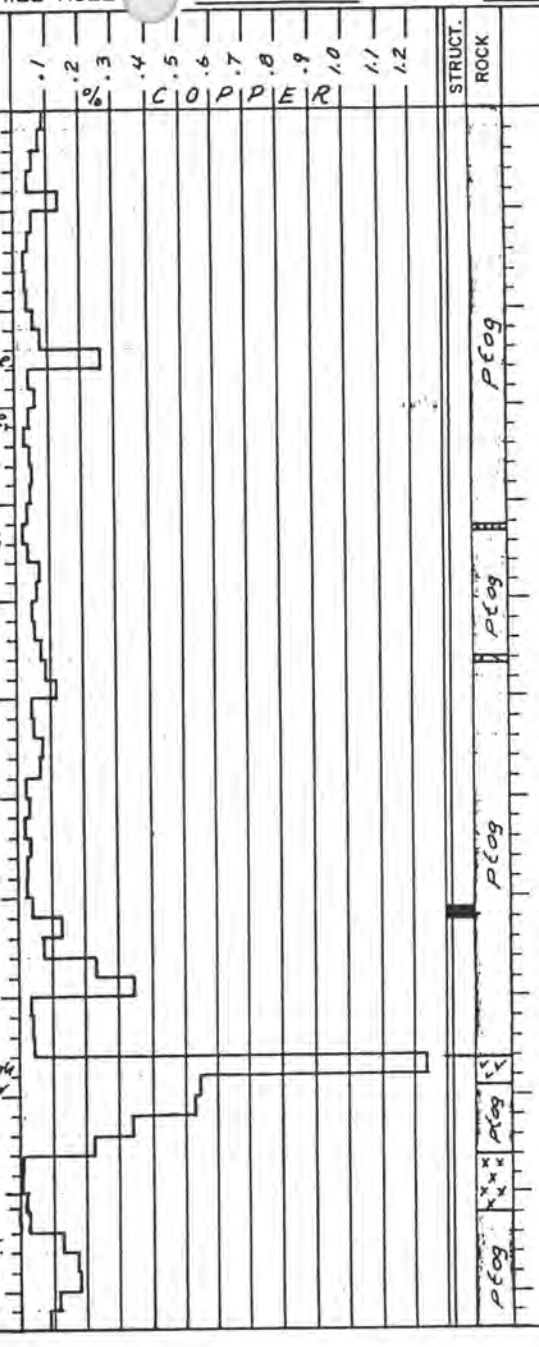
11-2478 = NX wireline core

Summary Alteration Log

0-1640: alteration is variable and ranges from deuteric to phyllic. Overall the alteration assemblage appears to conform to the "outer deep level" of Lowell & Guilbert. K-feldspar is generally fresh but may be "dusted" with a trace of sericite. Plagioclase is generally altered to a sericite-clay mixture ± minor carbonate. Biotite is commonly altered to chlorite ± magnetite and occasionally to magnetite, epidote and minor carbonate. Pyrite is more common than chalcopyrite & occurs in veinlets more often than as disseminations. Veinlets of sulfide, chlorite, carbonate, quartz, epidote & magnetite occur sporadically.

1640-2478: Phyllic-moderate to strong, generally a mixture of quartz and sericite with sulfides. Plagioclase is completely altered to sericite. K-feldspar is generally altered to sericite although patches of primary K-spar remain. Quartz has been added in veins & veinlets. Total sulfides increase by a factor of 2.5x. Chalcopyrite is more common than pyrite in veins & veinlets more common than disseminations.

2478' is total length



Summary Lithologic Log

0-851: Precambrian Oracle Granite: porphyritic quartz monzonite with numerous pink to red perthitic K-feldspar phenocrysts measuring up to 1 inch in diameter. Together with somewhat smaller plagioclase grains they are surrounded by a medium grained quartz-plagioclase K-feldspar matrix.

851-856: Precambrian (?) diabase

856-1120: Precambrian Oracle Granite

1120-1128: Tertiary-Cretaceous (?) Quartz Lat Porphyry: phenocrysts of quartz and feldspar in a fine-grained gray groundmass composed of quartz, K-feldspar, chlorite and carbonate.

1128-1932: Precambrian Oracle Granite with minor dikes of Precambrian (?) aplite.

1932-1983: Tertiary-Cretaceous Quartz Monzon Porphyry: quartz and feldspar phenocrysts wit abundant mafic minerals in a matrix of K-feldspar & minor quartz. Upper contact is a fau with probable major movement.

1983-2123: Precambrian Oracle Granite

2123-2240: Tertiary-Cretaceous Quartz Monzo ite Porphyry: phenocrysts of quartz, muscovi and feldspar in a fine grained matrix of clay, sericite, quartz and carbonate. Probably a different intrusive than 1932-1983 above.

2240-2478: Precambrian Oracle Granite.

KELVIN PROSPECT - PINAL CO., ARIZONA

C.S.M.C. DRILLHOLE J-1

FIGURE 3

J.P. VROMAN 11/75

PROJECT *Kelvin* DRILL HOLE NO. *J-2* SCALE *1" = 400'* PAGE NO. *1* OF *1*

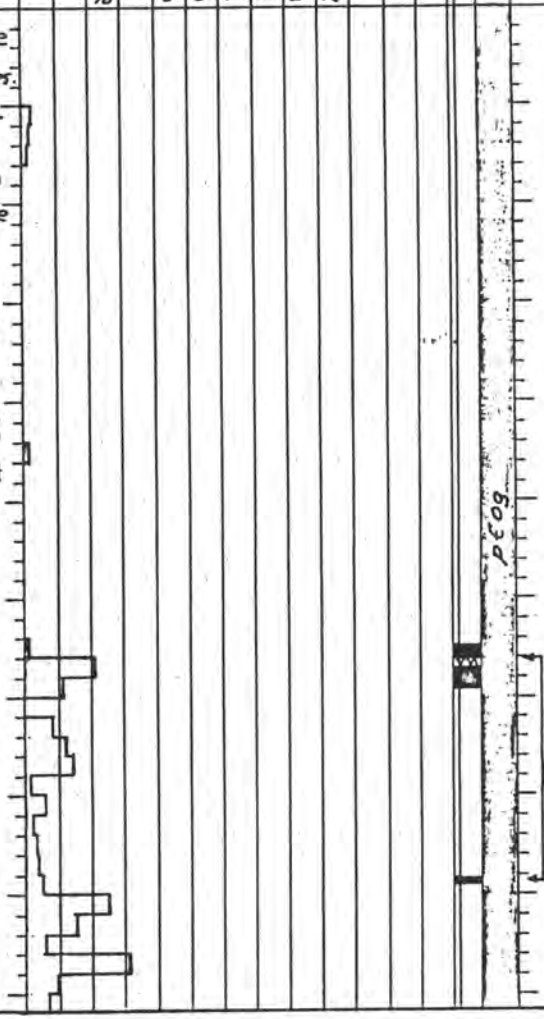
LENGTH	ASSAYS % Cu	PPM Mo	wt. % sulfide	py/cp
200	.0035	3	.10	
	.0110	4	1.62	
400	.0022	1		
600	.0026	4		
800			.07	13.6
	.0052	1		
1000	.0039			
1200	.0037	<1		
	.1594			
1400				1.29
	.0749		.72	
1600		10		
	.0443			8.18
1800				
	.1662	29	1.38	1.63
2000				

40-2018 = NX wireline core

Summary Alteration Log

0-2018: alteration is variable and generally increases in or near known sheared zones. Overall the alteration assemblage appears to conform to the "outer deep level" of Lowell & Guilbert. K-feldspar is generally fresh but may be "dusted" with a trace of sericite. Plagioclase is generally altered to a sericite-clay mixture ± minor carbonate. Biotite is commonly altered to chlorite ± magnetite and occasionally to epidote & minor carbonate. Total sulfide content is extremely low but increases by a factor of 20x ± below the fault at 1300'. Other than the marked increase in sulfides there is no distinct change in alteration from above to below the fault.

2018' is total length



Summary Lithologic L

0-2018: *Precambrian Oracle Granite*: porphyritic quartz monzonite with numerous pink to red perthitic K-feldspar phenocrysts measuring up to 1 inch in diameter. Together with somewhat smaller plagioclase grains they are surrounded by a medium grained quartz-plagioclase K-feldspar matrix.

KELVIN PROSPECT - PINAL CO., ARIZONA

C.S.M.C. DRILLHOLE J-2

FIGURE 4

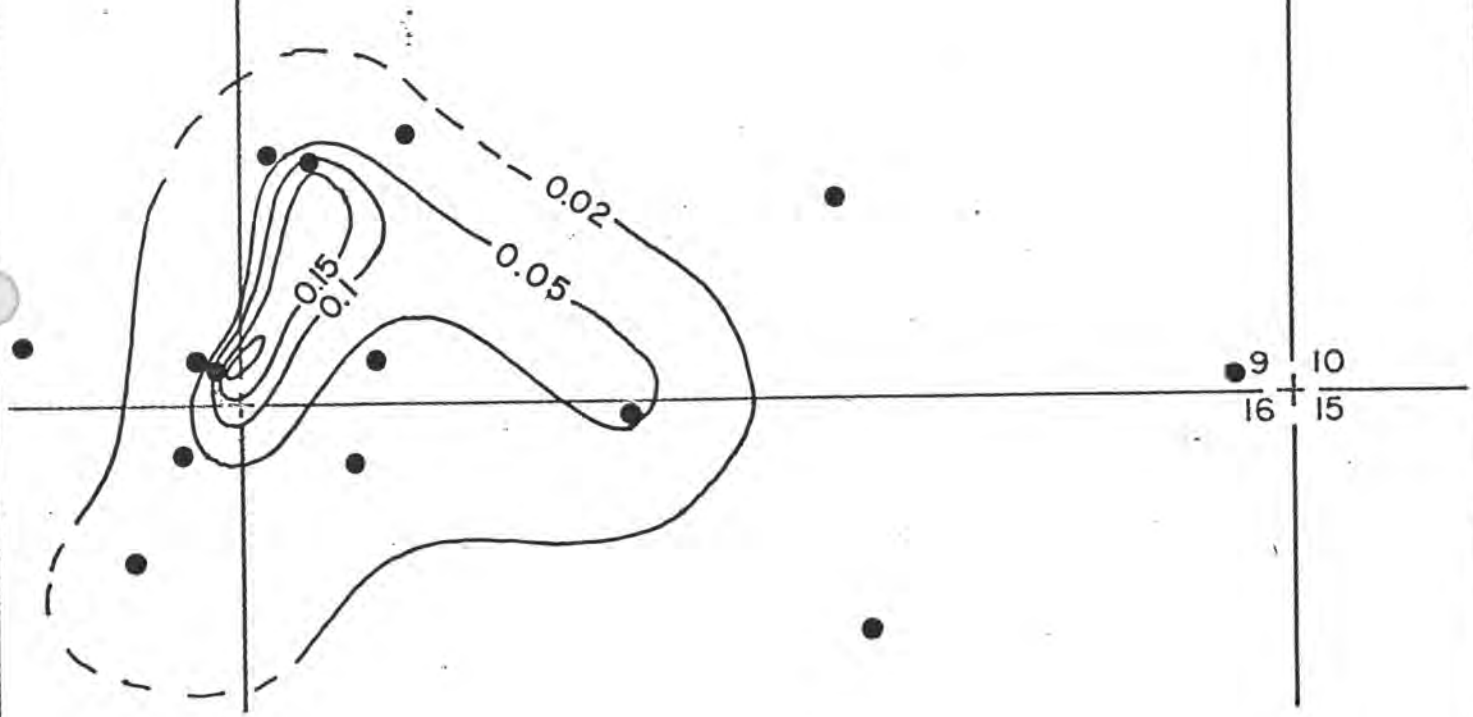
J.P. VROMAN 11/75

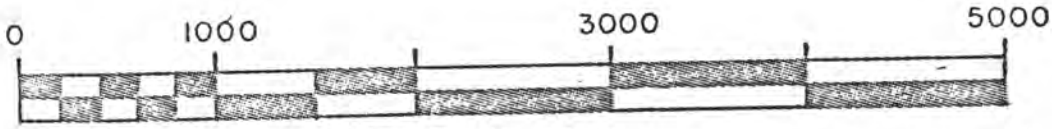
KELVIN PROJECT

T. 4 S., R. 13E.

PINAL CO., ARIZONA

PERCENT COPPER—
1500-2000' ELEVATION





SCALE IN FEET

FIGURE 6

JULY 1976

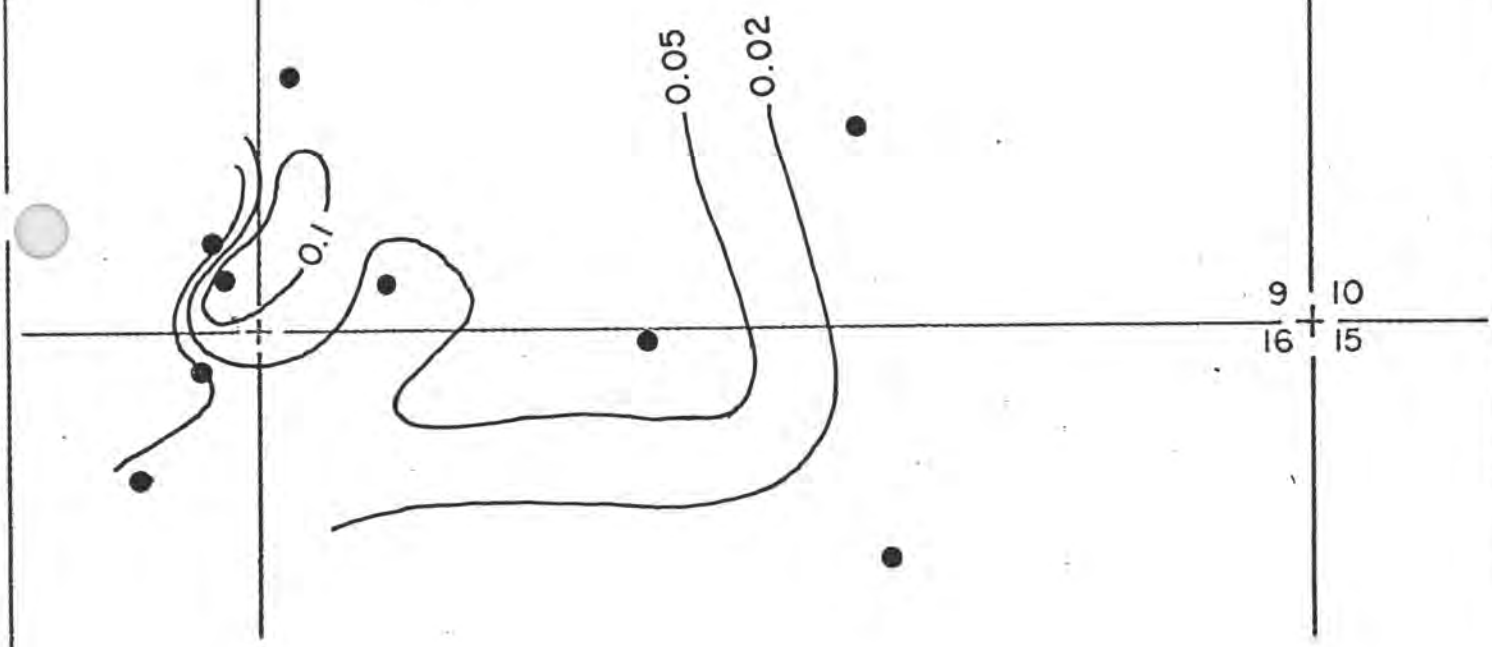
J. P. VROMAN

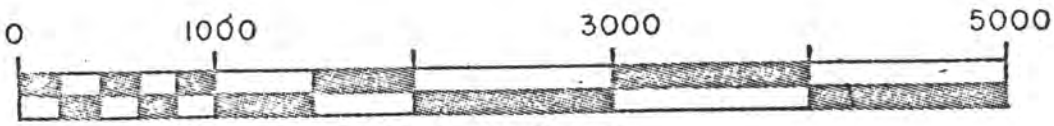
KELVIN PROJECT

T. 4 S., R. 13E.

PINAL CO., ARIZONA

PERCENT COPPER—
1000-1500' ELEVATION





SCALE IN FEET

FIGURE 7

JULY 1976

J. P. VROMAN

PROJECT KELVIN DRILL HOLE J-3 SCALE 1" = 100' PAGE NO. 1 OF

% Fe_3O_4 (comp)	Cu	Mo	S	weight % sulfide	py/cp
0.27	.048	.0002	.0043	.048	0
0.57	.0046	.0006	.1670	.322	10.6
0.69	.0055	.0001	.0328	.067	3.2
0.45	.0036	.0001	.1326	.252	23.2
0.55	.0031	.0003	.0340	.076	7.5
0.37	.0075	.0003	.1287	.248	10.5
0.40	.0066	.0002	.0253	.054	1.8
0.25	.0062	.0001	.3186	.604	24.5
0.26	.0051	.0002	.0173	.038	1.5
0.31	.0030	.0002	.0338	.066	6.7
0.34	.0044	.0004	.0116	.026	1.1
0.16	.0072	.0003	.0736	.145	6.0
0.30	.0382	.0003	.8045	1.543	13.0
0.74	.0030	.0004	.0259	.052	4.9
0.28	.0162	.0005	.2877	.554	8.7
0.89	.0029	.0005	.0259	.052	5.1

Miscellaneous

magnetite content was determined using an Elliot Geophysical Co. hand held susceptibility meter. Approximately three readings per foot were recorded and arithmetically averaged then converted to "apparent magnetite content" using graphs supplied with the instrument. The fourth column to the right illustrates the mode of occurrence, a dot for a disseminated grain(s) and a slash for veins & veinlets.

carbonate probably all calcite was determined by applying 10% HCl along the core. Nearly all of the carbonate occurs along hairline fractures - the abundance of these fractures is illustrated by the closeness of the slashes in the ninth column to the right. Occasional veins & CO_3 replacement (alteration) of plagioclase was noted but is not recorded on this log.

all other minerals were visually estimated. In general dots represent disseminated grains and slashes represent veins & veinlets.

Potassium feldspar alteration is represented in the 13th column to the right. Open rectangles = partial alteration; solid rectangles = complete (more or less) alteration to a chlorite-sericite mixture, usually dark blue-green in color.

Plagioclase, when altered, usually alters to sericite with secondary amounts of clay and chlorite, epidote and carbonate is minor. The alteration usually results in a pale to dark green soft material. The relative intensity of this type alteration is shown in the 11th column to the right. Less commonly the plagioclase alters to white sericite shown in the 12th column to the right.

Epidote in trace amounts is common throughout the core. Occassionally it is abundant, usually in the matrix of the rock, apparently as an alteration product. The relative amounts are shown in the 10th column to the right and in notes to the right of the rock column.

Secondary K-spar occurs in rare veins and veinlets throughout the length of the hole, the occurence of which is shown in the 8th column to the right. Some of the occurences noted may actually be "pink calcite".

Limonite: bright red to brown Fe oxides. From surface oxidation is common at the top of the hole and decreases to nil at approximately 140'. At 1250' to the bottom of the hole it occurs along fractures and as stain on sericitized plagioclase grains (dots); sometimes it becomes intense and the relative amounts are shown in the 6th column to the right.

"Blue stain" believed to be chloritic was noted in the interval ±250'-2850'. The stain occurs along fractures, is deep blue-green in color and is shown in the 7th column to the right.

Structure: solid horizontal lines show gouge zones. Closely spaced "X's" show broken and crushed core. No notation reflects relatively solid core. Gradations are apparent. Solid lines drawn completely through the column show the orientation with respect to core axis along which slickensides were noted or there is other evidence for possible movement.

casing left in hole:
cloth & cement plug
flange - welded to BX casing
16' NX casing
50' BX casing suspended inside NX casing

Drilling & Cost Data:
date started: 5 MAR 1976
date completed: 8 MAY 1976
total length: 3004 feet
core size: NX wireline
collar location: approximately 1000' FNL & 2300' FEL, Sec. 16, T.4S., R.11E., Pinal Co., Ariz.
collar elevation: ~2370'
inclination: -90°

average footage per shift = 18.3
direct drilling cost = 12.49/foot
mud, H_2O, etc. = 1.29/foot
assaying = 0.66/foot
splitting = 0.32/foot
thin sections = 0.05/foot
TOTAL $14.81/foot

drilling contractor: JOY MANUFACTURING CO.

Logged by: J. P. VROMAN

Summary Lithology & Alteration Log

0-16': no core - NX surface casing

zone of oxidation - brown limonite after pyrite & magnetite common - minor Cu oxide stain on fractures

16-3004' (unless otherwise noted): Precambrian Oracle Granite; porphyritic quartz monzonite, fresh & unaltered. Specimens contain numerous pink to red K-feldspar phenocrysts measuring up to 1.5 inches in length. Together with somewhat smaller plagioclase grains they are surrounded by a medium grained matrix composed of quartz, plagioclase & K-feldspar. Biotite is generally minor, primary muscovite is rare.

pyrite, chalcopyrite, quartz veining more common than immediately below. Magnetite occurs in veins & veinlets more commonly than as disseminations.

rock strongly broken & crushed

Plagioclase strongly altered to green sericite

possible fault zone with major movement

strong epidote in matrix - marked decrease in $CaCO_3$ extremely low magnetite zone extends ±4' above & below zone of strong epidote.

Plagioclase generally strongly altered to green sericite

1483½-1492: Laramide Quartz Latite Porphyry: upper contact @ 70° to core axis - lower @ 35°. Magnetite 0.23%. No K-spar seen. Phenocrysts of quartz and former feldspars up to 0.2" occur in a quartz-rich fine grain groundmass. Feldspars altered to green ser. Approx. 3 vol. % fine disseminated pyrite present. Dark gray former biotite altered to chlorite altered to sericite.

brecciated

zone of abundant brick red limonite occurring along fractures and as stain on plagioclase phenocrysts. The red plagioclase is soft and is probably sericitized.

speck of native copper

iron stained calcite crystals

strong epidote

zone of very low magnetite, potassium feldspars generally partially altered to sericite & chlorite

possible "healed" fault

strong epidote

2253.3-2254.5: Laramide Quartz Latite Porphyry - upper contact at 70° to core axis - lower contact at 45°. Chilled margin at upper contact not evident at lower. epidote and pyrite common. Lower portion brecciated.

2291-2297: brecciated and rehealed fault (?) zone.

zone of high pyrite, strongest chalcopyrite in hole. quartz veins & veinlets common, carbonate decreased, feldspars generally altered to sericite with some chlorite.

2461-2461.5: Laramide Quartz Latite Porphyry upper contact @ 42° to core axis; lower at 39°
2462.5-2463.2: Laramide Quartz Latite Porphyry upper contact at 43° to core axis; lower at 45°

visible MoS_2 in quartz vein (2470-2480 = 38 ppm Mo)

2345'-2745': relatively fresh Oracle Granite

rehealed breccia

plagioclase completely altered to green sericite, microcline generally altered to sericite and chlorite, magnetite probably destroyed, pyrite (disseminated) & qtz veinlets more common than above or below. Carbonate less abundant. Rock in general is more broken.

fresh Precambrian Oracle Granite

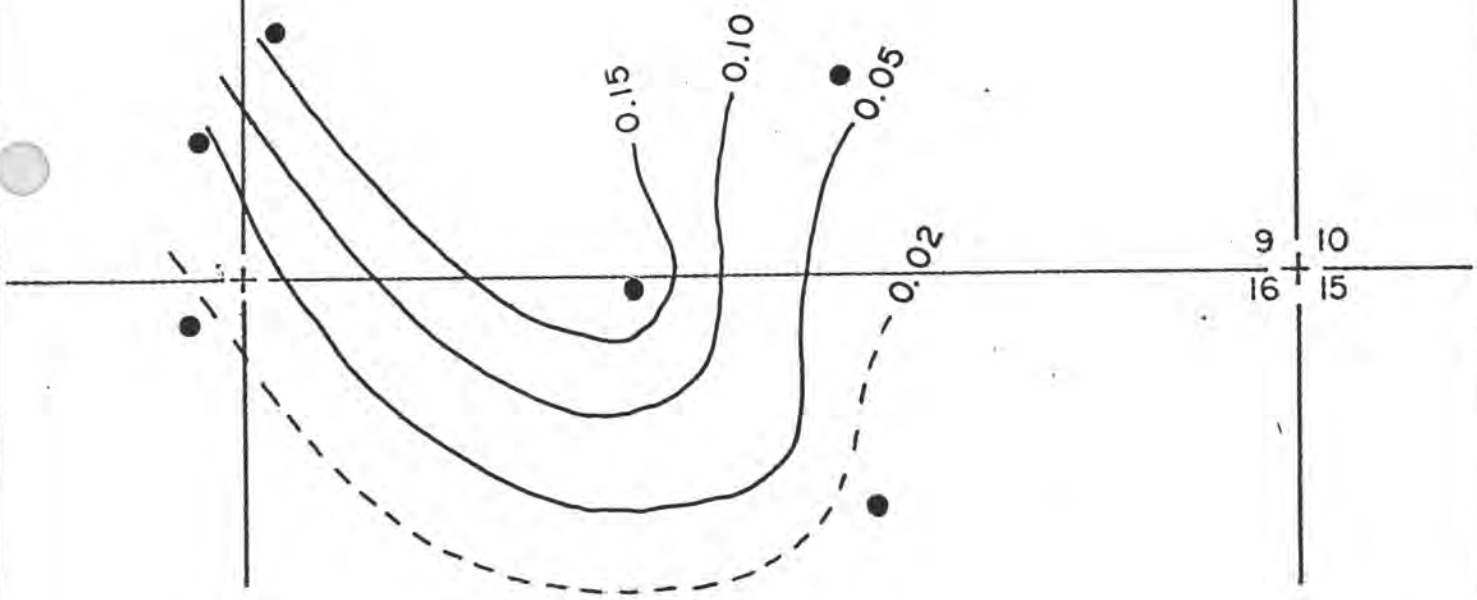
3004 feet is total length

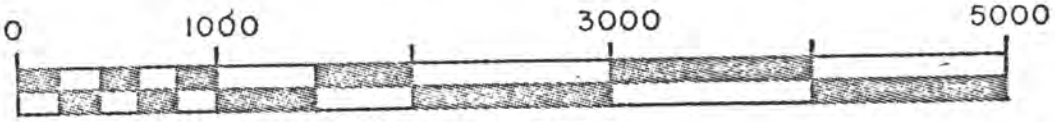
KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

PERCENT COPPER—
500-1000' ELEVATION





SCALE IN FEET

JULY 1976

FIGURE 8

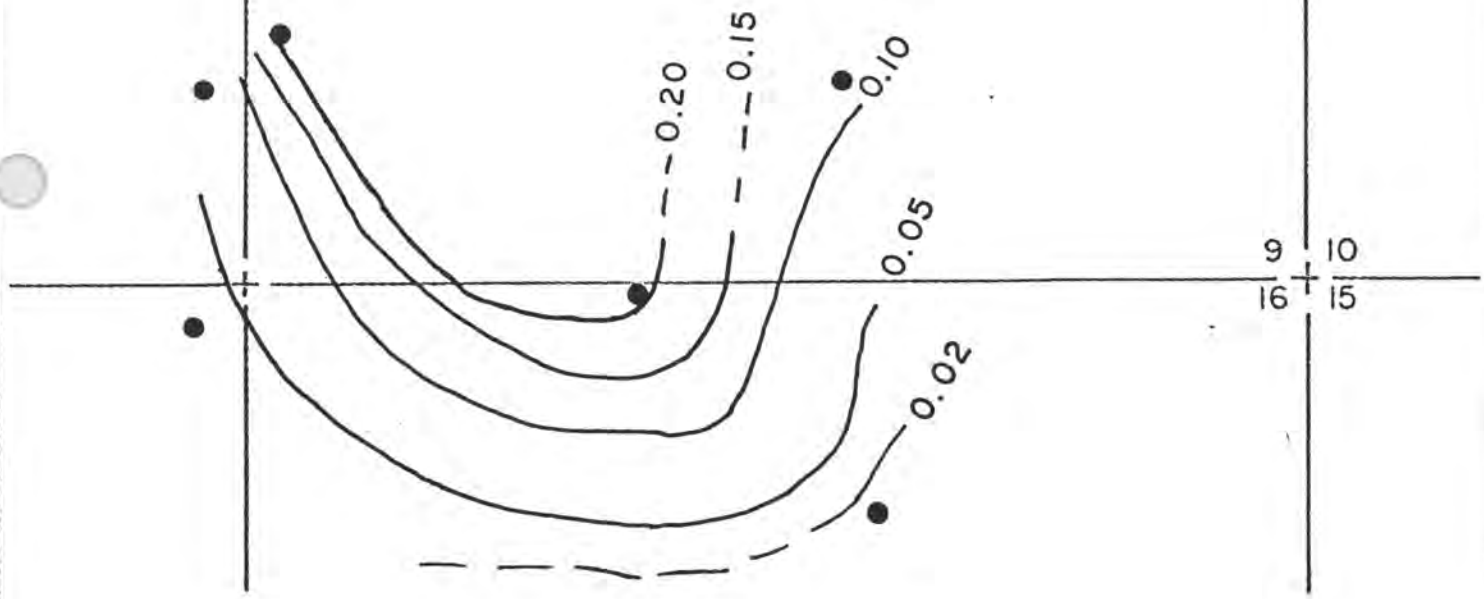
J. P. VROMAN

KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

PERCENT COPPER — 0-500' ELEVATION



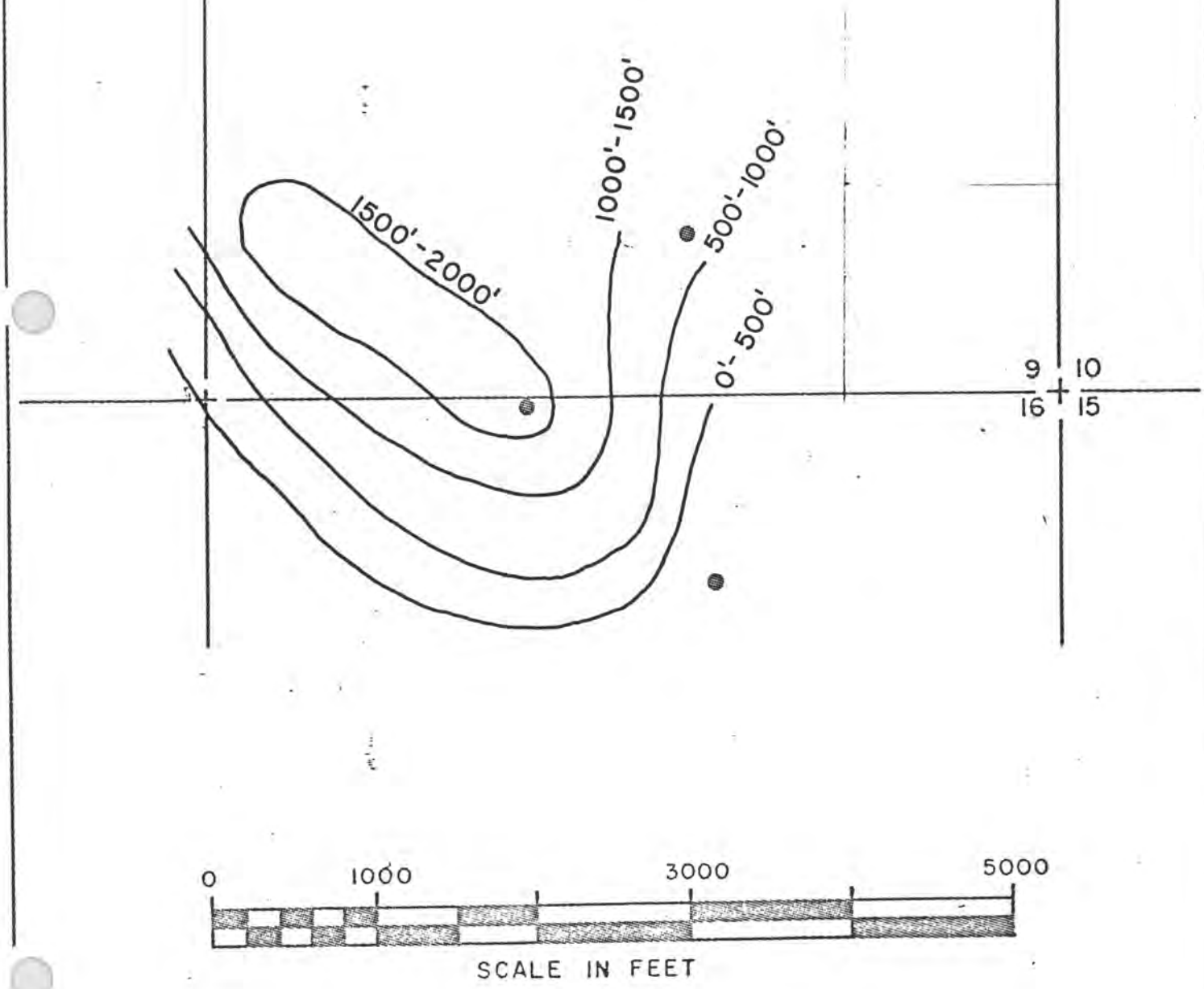
JULY 1976 **FIGURE 9** J. P. VROMAN

KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

.0 5 PERCENT COPPER CONTOUR
AT VARIOUS ELEVATIONS (generalized)



JULY 1976

FIGURE 10

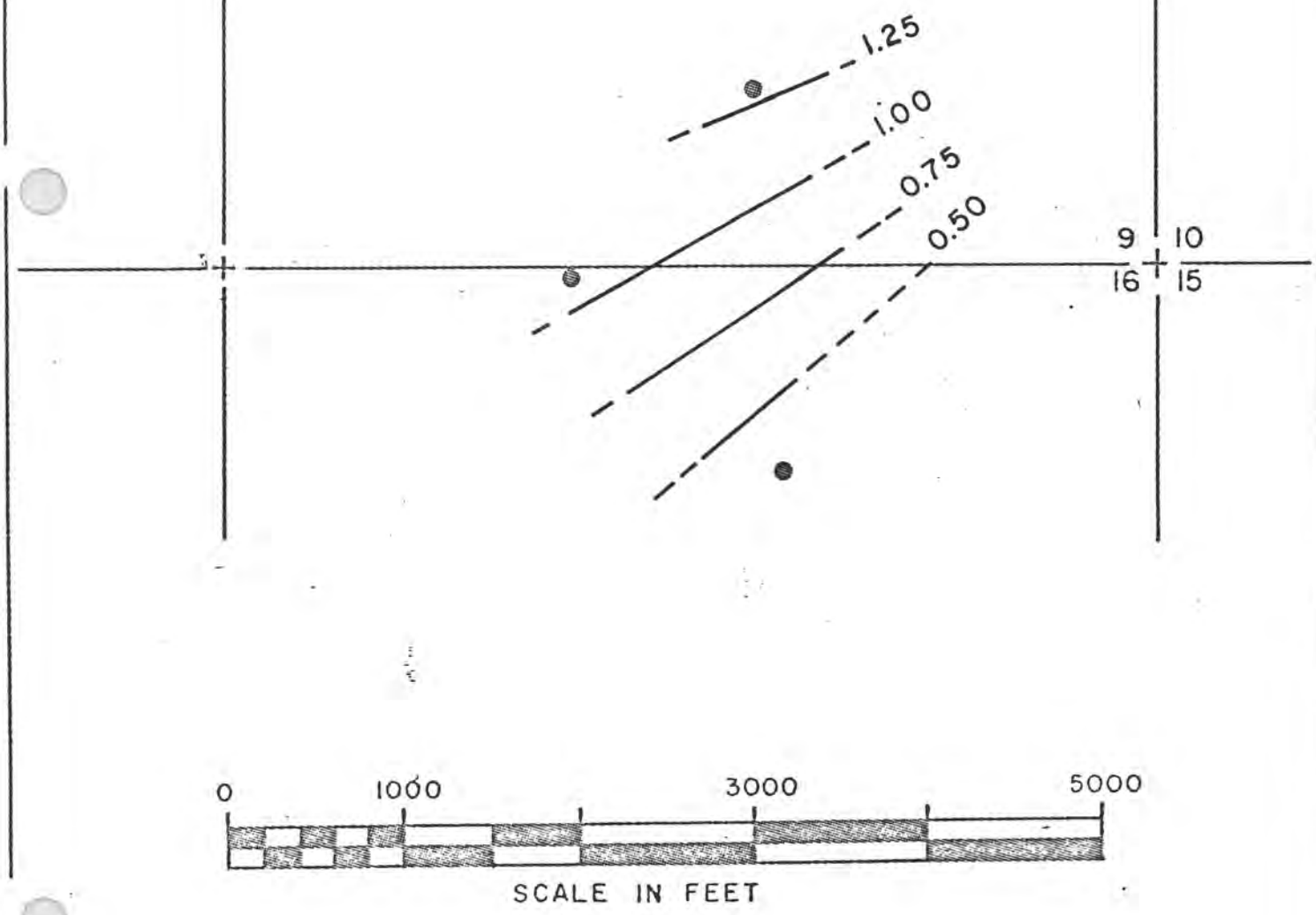
J. P. VROMAN

KELVIN PROJECT

T. 4 S., R. 13E.

PINAL CO., ARIZONA

TOTAL WEIGHT PERCENT SULFIDES
0'-500' ELEVATION



JULY 1976

FIGURE II

J. P. VROMAN

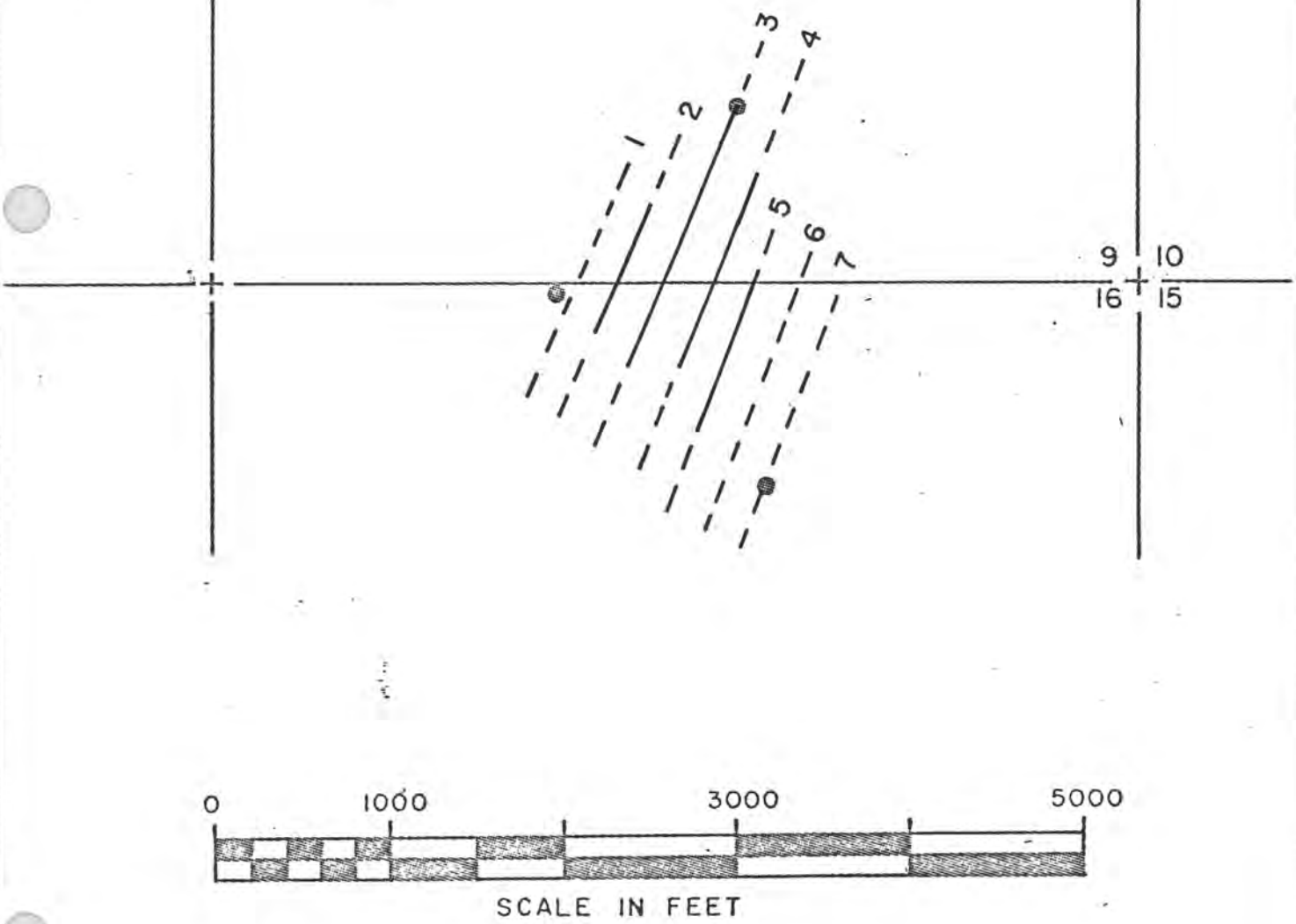
KELVIN PROJECT

T. 4 S., R. 13E.

PINAL CO., ARIZONA

WEIGHT PERCENT PYRITE / WEIGHT PERCENT CHALCOPYRITE

0'-500' ELEVATION



JULY 1976

FIGURE 12

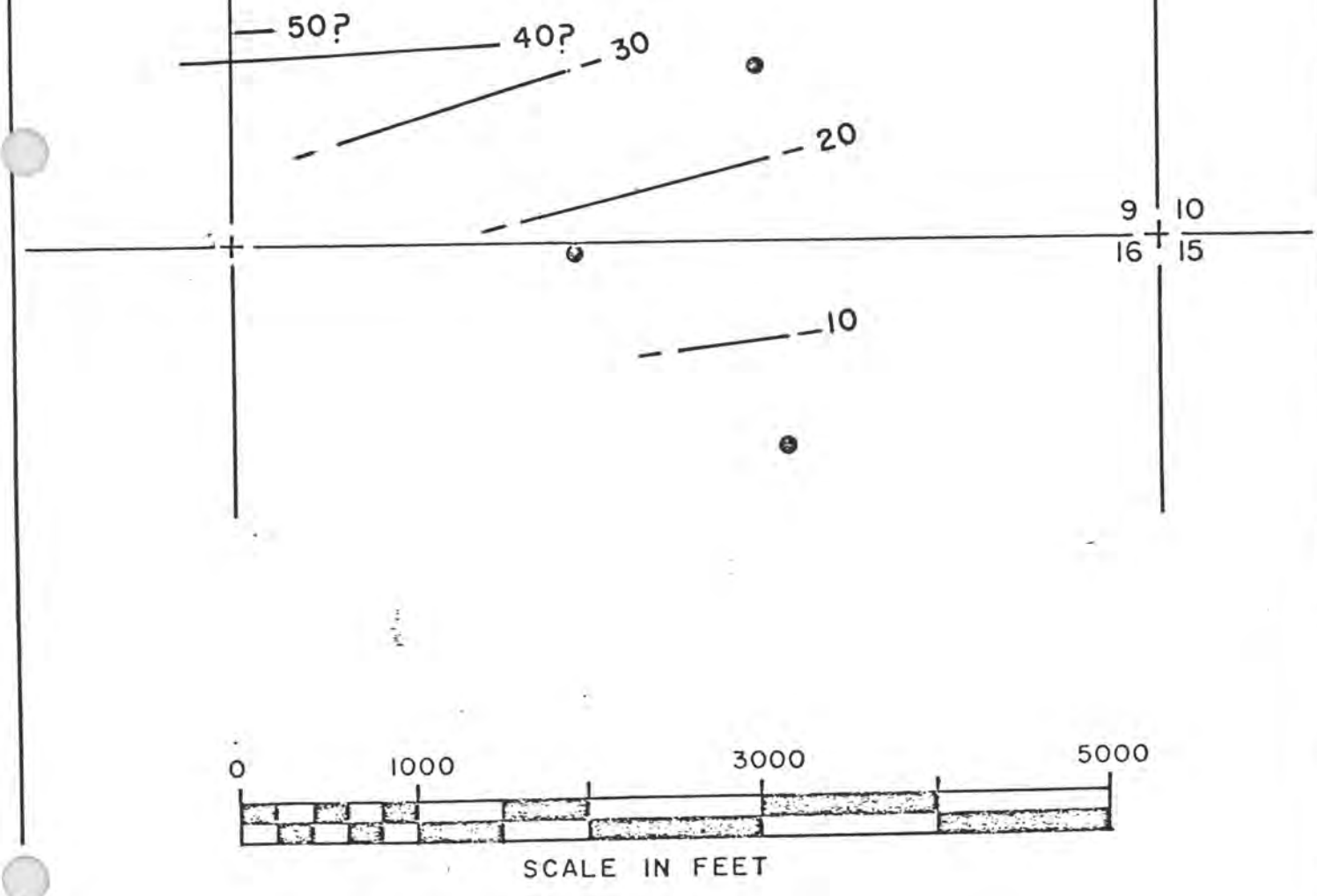
J. P. VROMAN

KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

MOLYBDENUM (parts per million)
0'-500' ELEVATION



JULY 1976

FIGURE 13

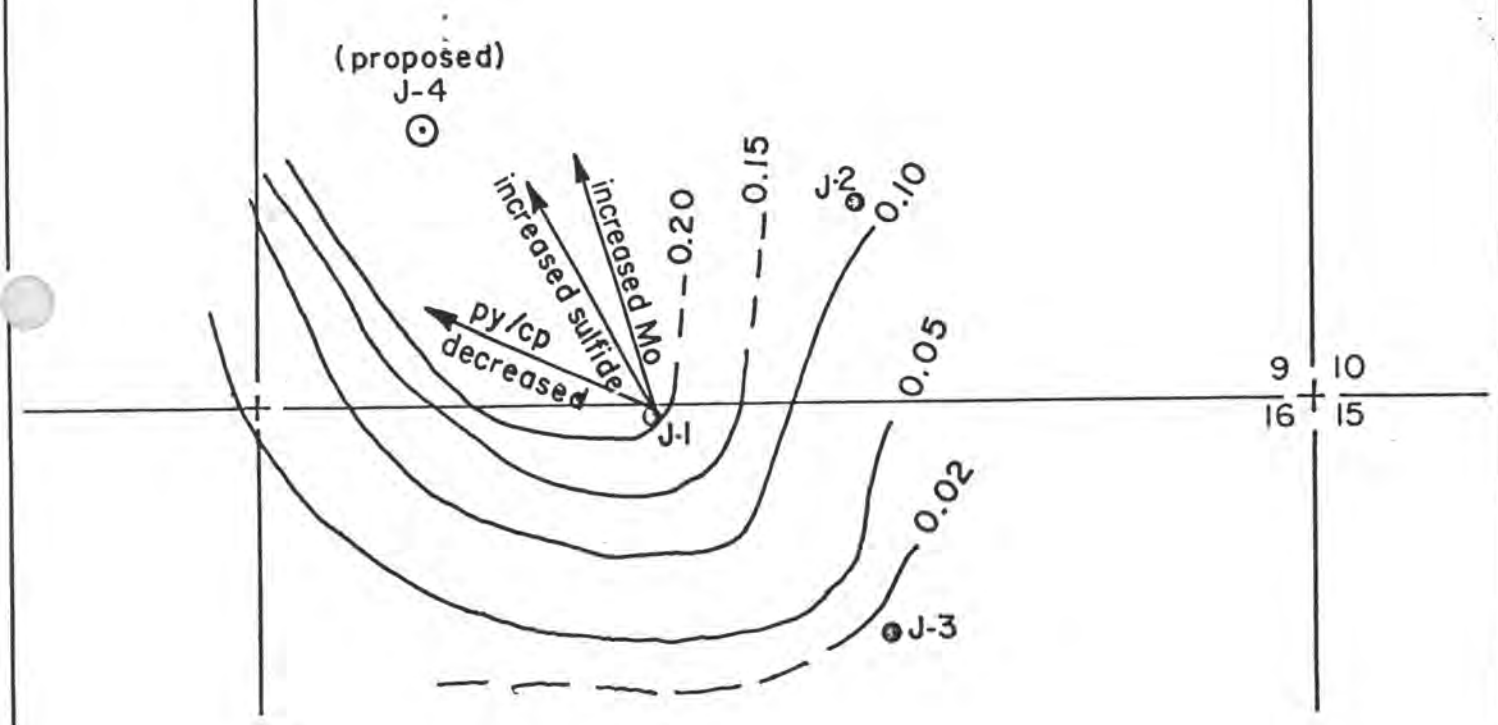
J. P. VROMAN

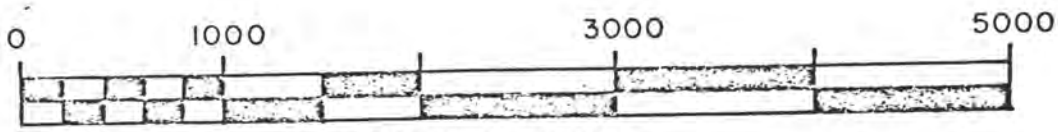
KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

SUMMARY OF ANALYSIS OF PRIOR DRILLING 0-500' ELEVATION





SCALE IN FEET

JULY 1976

FIGURE 14

J. P. VROMAN

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE J-4 SCALE 1" = 100' PAGE NO. 1 OF 5

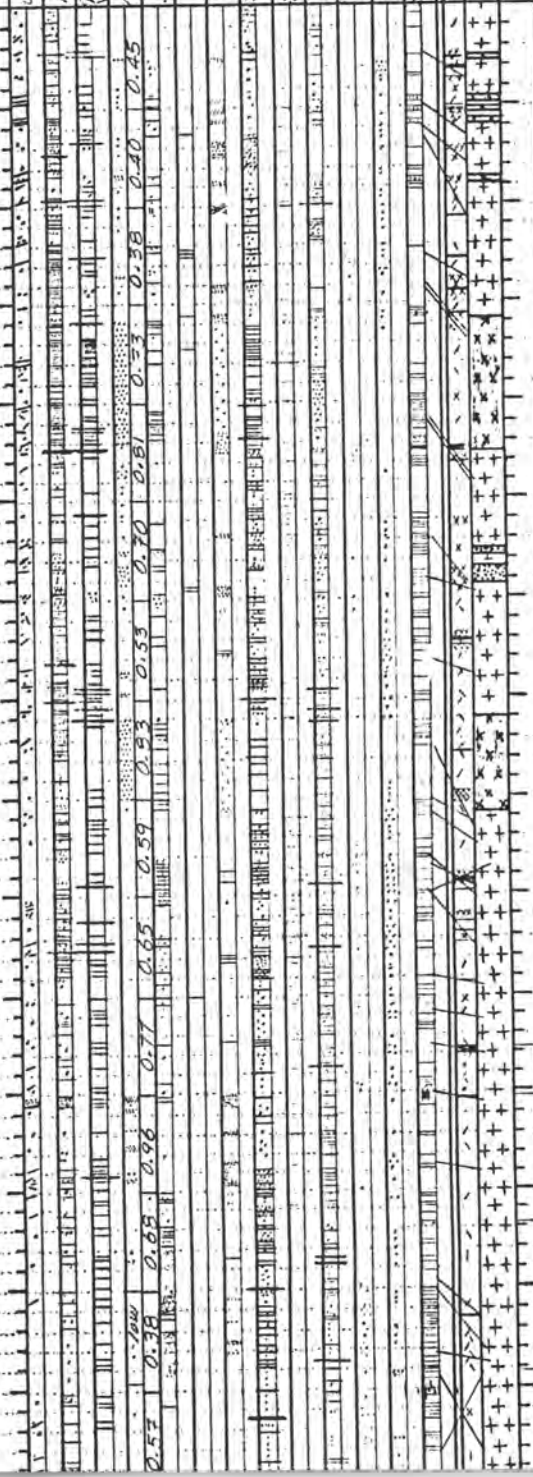
LENGTH	Co Fe_3O_4 (comp)	Cu	Mo	S	Calc. wt % sulfide	Py/CP	Miscellaneous	Chalcopy	Pyrite	Quartz in yns & vnlts	Magnet	Limonite	Mo Sc	Secondary biotite	Secondary K-spar	Carbonate	Epidote	Green sericite	White sericite	Chlorite & sericite	STRUCT.	ROCK	Summary Lithology & Alteration Log
							0-582: drilled by Minbanco Corporation: started: 11/15/68 completed: 11/20/68 6½ inch hammer bit. Minbanco designation is hole J-2.																23' = base of strong weathering; 53' = base of surface weathering
100							C.S.M.C. re-entered the hole 10/30/76 & designated the hole J-4.																
							information from 0-582 from Minbanco Logs.																
200																							
300		.0240																					
400																							
500																							
600	0.56	.0314	.0004	.4870	0.940	9.4						0.57											590-670, 672-675, 677-689, 691-775 } Precambrian Oracle Granite
700	0.42	.0136	.0004	.1760	0.343	7.7						0.49											670-672, 675-677, 689-691 } Brecciated & rehealed Precambrian Oracle Granite. Average orientation of contacts = 55° to core axis. 690-[illegible] numerous shears @ 45° to core axis
												0.31											

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE NO. J-4 SCALE 1" = 100' PAGE NO. 2 OF 5

LENGTH	% Fe_3O_4 (mag)	ASSAYS (%) Cu	Mo	S	calc. wt. % sulfide	py/cp
800						
900	0.57	.0322	.0011	.7324	1.402	14.1
1000						
1100	0.68	.0145	.0005	.1842	0.359	7.6
1200						
1300						
1400	0.62	.0116	.0004	.0741	0.150	3.5

Miscellaneous



Summary Lithology & Alteration Log

PROPYLITIC (?) ALTERATION ASSEMBLAGE: Epidote common in veinlets, veins, in interstices & as alteration product after biotite. Mafic minerals are all generally chloritized. Secondary K-spar is common as vein envelopes (usually quartz-sulfide) and in distinct "bands" - occassionally partially replacing plagioclase. Minor sericite occurs occassionally in groundmass, as aggregates, rare veinlets and occassionally as weak to moderate alteration along rims of plagioclase. Trace 2nd bi

775-776, 785-787, 790-793, 800-803, 806-809, 835-839, 908-974.5, 1110-1158 — Tertiary-Cretaceous Granodiorite Porphyry: a medium-gray rock with plagioclase phenocrysts up to 0.25 inch in a medium-grained (0.1") groundmass of plagioclase, quartz, biotite, magnetite and probable interstitial K-spar. Well defined chilled margins up to 20 feet in width are generally present when in contact with Precambrian Oracle Granite or Precambrian Diabase. Often when dikes of this unit are less than 30 feet in width the entire dike is chilled and the typical equigranular to slightly porphyritic texture is not present. Average magnetite content is 0.94% (some may be added).

1025-1028, 1034-1042 — Precambrian Diabase

[illegible], [illegible], [illegible], [illegible], [illegible], [illegible], 804-835, 839-908, 974.5-1025, 1025-1034, 1042-1110, 1158-1603 — Precambrian Oracle Granite: porphyritic quartz monzonite with numerous pink K-spar phenocrysts up to 1.5" (generally euhedral); plagioclase is generally 0.25" to 0.50" in diameter in a coarse to medium grained groundmass of quartz, K-spar, plagioclase, biotite, minor magnetite and [illegible].

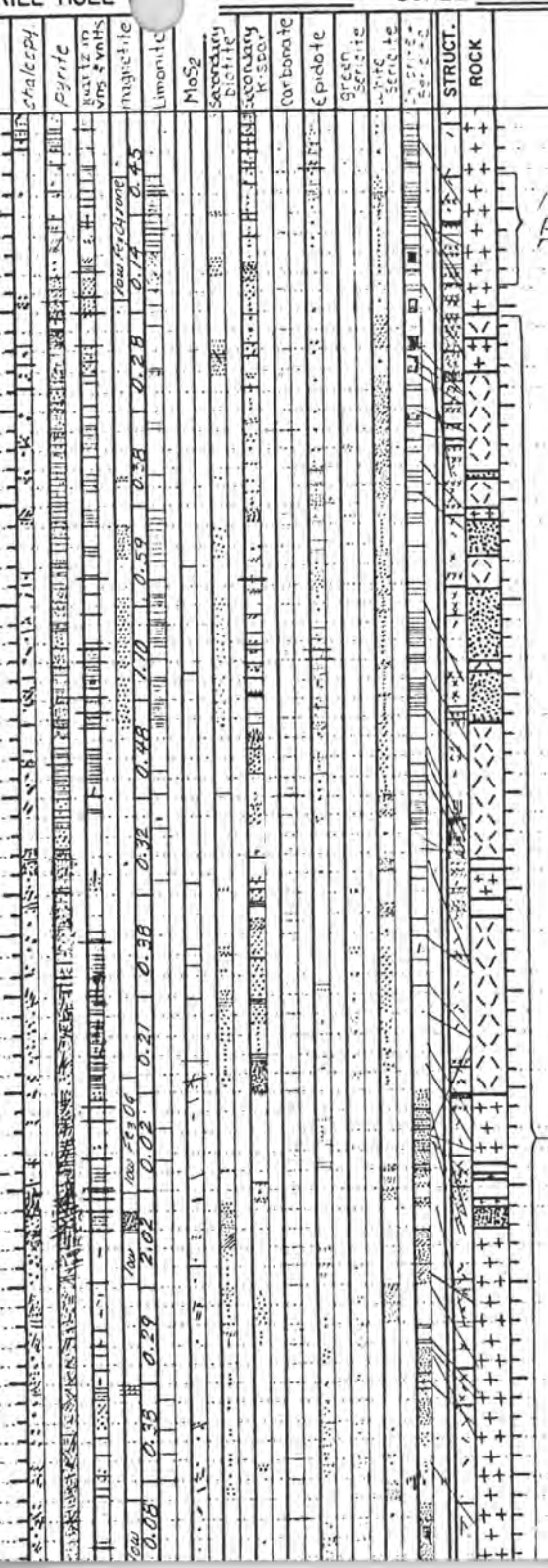
brecciated & healed Precambrian Oracle Granite

abundant limonite after pyrite along [illegible] minor staining on plagioclase.

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE J-4 SCALE 1" = 100' PAGE NO. 3 OF 5

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	calc. wt. % sulfide	Py/Cp	Miscellaneous
1600							
1700	0.48	.0400	.0005	.7000	1.350	10.7	
1800							
1900	0.17	.0257	.0060	1.0803	2.047	26.6	
2000	2.43	.2568	.0109	3.7350	7.240	8.8	1920'-3040' = 1120' = zone of high molybdenum = 67 PPM Mo (compared to 6 PPM above & 5 PPM below zone.
2100	0.25	.0716	.0065	1.0919	2.114	9.2	2040'-2400' = 360' = zone of high cobalt = 57 PPM Co (compared to 16 PPM above & 21 PPM below zone.
2200							



Summary Lithology & Alteration Log

1532-1589: zone of abundant brick red limonite after pyrite in veinlets and along fractures (transported?) rare granular purite remains in centers of some veinlets

1603-1616, 1632-1683, 1688-1703, 1726-1743, 1781-1786, 1813-1883, 1912-2003 — Paleocene Teacup Granodiorite: (see description below).

1683-1688, 1709-1726, 1743-1781, 1786-1813, 2060-2071 — Precambrian Diabase

1883-1890, 1905-1912, 2038-2043, 2045-2056 — probable former porphyry that has undergo[illegible] nearly texture destructive alteration. Very fine-grained, light colored (c.i. = 15). Form[illegible] phenocrysts now altered completely to sericite & minor clay. Former mafics have altered to sericite & chlorite. Groundmass composed of quartz sericite & clay(?). Patches of chlorite [illegible] in upper two intercepts - secondary biotite in lower

"SERICITIC" ALTERATION ASSEMBLAGE:
Epidote generally weak to absent, mafics strongly partially chloritized at top of interval becoming weaker downhole & finally becomes absent. Second K-spar weaker than above or below. Secondary biotite only locally present. Sericite varies, general[illegible] moderate to strong in former plagioclase phenocrysts, often strong in matrix and rarely in K-spar phenocrysts - minor to weak clay often associated with sericite which probably gives alteration product different shades of green color ([illegible] green logged under green sericite, [illegible] green logged under "chlorite + sericite")

1616-1632, 1703-1709, 1890-1905, 2003-2038, 2043-2045, 2056-2060, 2071-2272 — Precambrian Oracle Granite

ROJECT KELVIN DRILL HOLE NO. [illegible]-4 SCALE 1" = 100' PAGE NO. 4 OF 5

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	calc. wt.% sulfide	py/cp
2300	3.10	.2304	.0076	1.5850	3.196	3.8
	3.87	.3852	.0022	1.5000	3.190	1.9
2400	0.14	.3925	.0192	0.8700	2.020	0.78
2500						
2600	0.30	.1396	.0071	0.3595	0.812	1.0
2700	0.17	.1450	.0058	1.3540	2.680	5.4
2800	0.22	.1127	.0035	0.5020	1.052	2.2
2900						
3000	0.14	.0382	.0020	0.9950	1.900	16.2

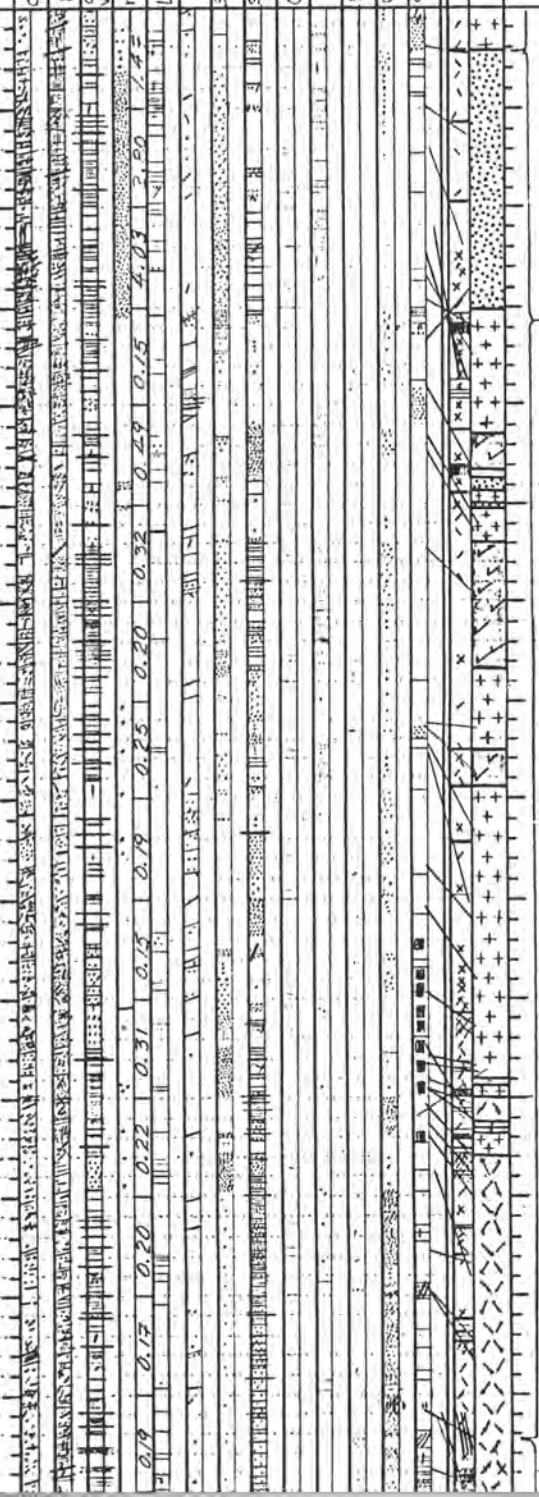
Miscellaneous

1960'-2600'-640" = zone of high tungsten = 9 ppm (compared to 4 ppm above & 5 ppm below).

110' = 0.4118% copper + 0.0127% Molubdenum = 0.4753% Copper equiv. (from 5 replicate assays)

280' = 0.2836% copper + 0.0104% Molybdenum = 0.3356% copper equiv.

540' = 0.2118% copper + 0.0083% Molubdenum = 0.2533% copper equiv.



Summary Lithology & Alteration Log

2272-2401, 2486-2493, 2500-2502 } Precambrian (?) Diabase: generally dar gray rock - here fine-grained and often exhibiting ophitic texture with interloc grains of plagioclase and pyroxene (probably augite) up to 0.1 inch in length. Rock here is strongly altered with secondary biotite. Average magnetite content = 3.36%; magnetite increase toward bottom of unit as probably does seconda biotite

Secondary K-spar and/or secondary biotite common. S ary biotite probably associated with magnetite in diabase (becomes very strong near 2400'). Secon K-spar common running plagioclase grains & in veinlets (veins become more common at bottom of interval. Epidote generally weak (except locally s in granodiorite porphyry II & as veinlets in diabase. Mafics only weakly chloritized (spotty). Sericite al tion of plagioclase weak to "dusted". Overall al assemblage = POTASSIC

2465-2482, 2520-2584, 2626-2645 } Tertiary-Cretaceous Granodiorite Porphyry II: medium to dark gray rock with approximately 50 perce phenocrysts of anhedral quartz up to 0.3" in di subhedral plagioclase up to 0.4 inch in length an euhedral to subhedral biotite up to 0.1 inch in c medium grained groundmass of K-spar, quart biotite (possibly secondary). Magnetite = 0.27% Much darker in appearance than Teacup Gr diorite although they may be closely related. Probably correlative with Rhyodacite Porphyry of the U.S.G.S.

2482-2486: gouge with pC oracle & Granodiorite porp

2401-2465, 2493-2500, 2502-2520, 2584-2626, 2645-2790, 2793-2800, 2812-2815, 2817-2830 } Precambrian Oracle Granite

2790-2793, 2800-2812, 2815-2817, 2830-3039 } Tertiary (Paleocene) Teacup Granodio medium to light gray rock with 50-60 percent phenocrysts of (in order of decreasing abundance) plagioclase (0.2-0.3 inch), quartz (subhedral up to 0.3 inch), and biotite (up to 0.2 inch) in a fine to medium-gra groundmass of quartz, K-spar (minor) plus plag clase, biotite and possible hornblende. Avera magnetite = 0.18%. Probably correlative with porp between 1630 and 2005 above.

weak to moderate alteration of plagioclase to sericite.

DRILL HOLE RECORD

PROJECT KELVIN DRILL HOLE J-4 SCALE 1"=100' PAGE NO. 5 OF 5

LENGTH	% Fe_3O_4 (comp)	ASSAYS (%) Cu	Mo	S	Calc. wt. % sulfide	Py/cp	Miscellaneous	chalcopy	pyrite	quartz in vns & vnlts	magnetite	Limonite	MoS_2	Secondary biotite	Secondary K-spar	Carbonate	Epidote	green sericite	white sericite	chlorite + sericite	STRUCT.	ROCK	Summary Lithology & Alteration Log
											0.20												"green sericite" in this interval may actually be chlorite in sheared and gouge zones
3100	0.21	.0108	.0005	0.9250	1.741	54.8	3104 is total length				0.18												3039-3104: Precambrian Oracle Granite: secondary K-spar extremely weak, secondary biotite, epidote & quartz veining generally absent, carbonate in occassional veinlets, mafics generally altered to chlorite, plagioclase weakly altered to sericite. (PSOPYL

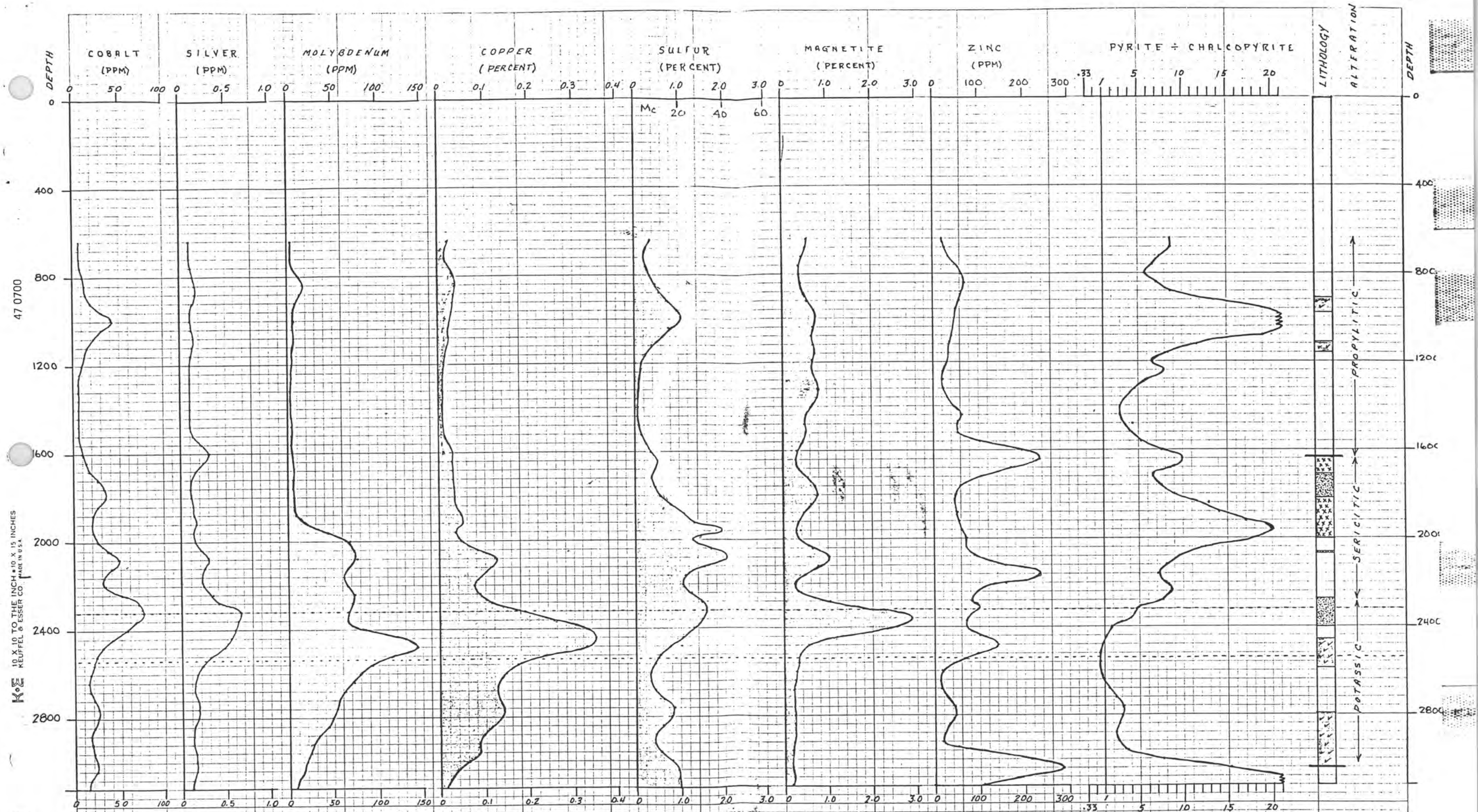
date started: 30 Oct. 1976
date completed: 5 Jan. 1977
total length: 3104 feet
core size: NX wireline: 582-3104
collar location: approximately 840' FWL & 1400' FSL, section 9, T. 4 S., R. 13 E., Pinal Co., Arizona.
collar elevation: ~ 2133 feet.
inclination: −90°
drilling contractor: JOY MANUFACTURING CO.

Average footage/shift = 17.7
Direct Drilling Cost: 13.73/ft
Mud, additives, water: .83/ft
Reaming .76/ft
Casing, time & left in hole .84/ft
Assaying .87/ft
Splitting .59/ft
Thin sections .05/ft
(2513') TOTAL $17.67/ft

CASING LEFT IN HOLE:

17 feet (0-17): 8 5/8"
584 feet (0-584): 4"
(capped with tin can in end of casing).

Logged By: J. P. VROMAN



CITIES SERVICE MINERALS CORPORATION – KELVIN PROJECT – PINAL CO., ARIZONA – HOLE J-4

(all values have been smoothed using a five point weighted running average)

J.P. VROMAN 7 MAR 77

47 0700
K&E 10 X 10 TO THE INCH • 10 X 15 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

MEMORANDUM

TIES SERVICE MINERALS CORP.

DATE May 3, 1977

TO C.S.M.C. Staff DEPT.

FROM J. P. Vroman DEPT.

RE: Replicate assays on crusher rejects from drill core

The Tucson office recently had 18 samples analyzed for copper and molybdenum at five different local laboratories. Each sample was a crusher reject of a 10-foot interval of NXWL core. A tabulation of the results of this test is enclosed for your examination.

It should be noted that copper assays were repeated within 10 percent of the mean value 78.9% of the time. One lab (B) reported within 10 percent of the mean value 100% of the time while another lab (D) reported within 10 percent of the mean value only 66.7% of the time.

Also, molybdenum assays were reported within 30 percent of the mean value 72.2% of the time. One lab (D) reported within 30 percent of the mean value 83.3% of the time while another lab (E) reported within 30 percent of the mean value only 61.1% of the time. Most labs reported greater than a 30 percent deviation of the mean over the full range of values. However, all of the greater than 30% deviations for lab B occurred at the low end of the range. Variations in reported Mo values up to 767% occurred (sample J4-177).

These results may have a bearing on your interpretation of geochemical results - especially Mo surveys.

It is hoped that the enclosed sheet will be self-explanatory - if you do have any questions, please call me in Tucson.

JPV:sbc
atch.

AMPAD EFFICIENCY LINE NO. 6636

% Copper**

PPM Molybdenum*

INTERVAL	SAMPLE	LAB A (American Analytical)	LAB B (Skyline)	LAB C (Rocky Mtn Geochem) ●	LAB D (Southwest Assay)	LAB E (Cities Service Miami)	MEAN	LAB A (American Analytical)	LAB B (Skyline)	LAB C (Rocky Mtn Geochem) ●	LAB D (Southwest Assay)	LAB E (Cities Service Miami)*	MEAN
2300-2310 1	J4-172	.43	.44	.38	.40	.43	.41	154	120	100	154	62	118
2310-2320 2	-173	.33	.29	.27	.24	.26	.28	73	60	53	81	54	64
2320-2330 3	-174	.13	.15	.10 (.15)	.14	.15	.14	59	46	27 (36)	53	55	46
2330-2340 4	-175	.27	.28	.17 (.30)	.31	.26	.26	151	150	59 (166)	168	73	128
2340-2350 5	-176	.34	.46	.44 (.46)	.40	.51	.44	41	44	33 (59)	56	24	43
2350-2360 6	-177	.11	.12	.13	.15	.13	.13	13	6	11	16	46	18
2360-2370 7	-178	.12	.13	.16	.13	.11	.13	6	6	11	24	43	18
2370-2380 8	-179	.49	.39	.38	.32	.43	.40	26	12	12	20	35	21
2380-2390 9	-180	.56	.48	.50	.64	.42	.52	32	18	27	38	30	29
2390-2400 10	-181	.37	.40	.44	.45	.40	.41	24	20	26	27	29	25
2400-2410 11	-182	.46	.48	.40	.52	.39	.45	119	85	97	96	42	88
2410-2420 12	-183	.25	.26	.24	.25	.12	.22	328	220	225	231	191	239
2420-2430 13	-184	.28	.32	.28	.34	.31	.31	99	95	97	119	89	100
2430-2440 14	-185	.36	.35	.38	.34	.38	.36	143	120	140	111	110	125
2440-2450 15	-186	.53	.57	.58	.56	.55	.56	248	280	225	321	193	253
2450-2460 16	-187	.30	.32	.34 (.35)	.34	.29	.32	238	180	330 (225)	209	179	227
2460-2470 17	-188	.56	.55	.61	.57	.55	.57	70	55	74	72	91	72
2470-2480 18	J4-189	.40	.40	.33 (.46)	.43	.43	.41	289	260	198 (242)	244	71	217
19													
2300-2480 20	MEAN	.3498	.3550	.3406 (.3594)	.3628	.3400	.3511	117	99	102 (106)	113	79	102
" " 21	Cu. Equiv. Mo = 5X Cu	.4085	.4044	.3918 (.4124)	.4086	.3795	.4021						
" " 22	% deviat. from mean	1.6	0.6	2.6 (2.6)	1.6	5.6	0.0	14.7	2.5	0.0 (3.9)	11.8	22.5	0.0
2370-2480 23	MEAN	.4186	.4109	.4073 (.4200)	.4327	.3882	.4118	147	122	132 (126)	135	96	127
" " 24	Cu Equiv. Mo = 5X Cu	.4921	.4719	.4733 (.4830)	.5002	.4362	.4753						
" " 25	% deviat. from mean	3.5	0.7	0.4 (1.6)	5.2	8.2	0.0	15.7	3.9	3.9 (0.8)	6.3	24.4	0.0
26													
27	ALL SAMPLES = CRUSHER REJECTS												
28													
29	** greater than 10% deviation from mean circled							* greater than 30% deviation from mean circ					
30													
# deviations from mean 31		-4	-0	-4	-6	-5		-5	-4	-6	-3	-7	
COST		$72.00	$101.25	$73.00	$90.00								

● number in parenthesis reflect rerun values.

* converted from reported MoS_2 values

COLLAR ELEVATION 9133

AMPAD EFFICIENCY, LINE NO. 6636

CSMC KELVIN PROJECT: HOLE J-4

PAGE 1 of 2

completed 24 JAN 71

INTERVAL	1 % Cu	2 wt. % Cp	3 % S in Cp	4 % S	5 % S in py	6 wt. % py	7 TOTAL SULFIDES	8 % Cp	9 % Mo	10 % Fe_3O_4	11 % Zn	12 PPM Ag	13 PPM Co	14 PPM Pb
	ASSAY	Cu × 2.8885	Cu × 1.00925	ASSAY	column 4 minus column 3	column 5 × 1.871	column 2 + column 6		ASSAY		ASSAY	ASSAY	ASSAY	
600-640 1	.0314	.0907	.0317	.4870	.4553	.852	.94	9.4	.0004	.56	.0023	<0.2	8	
640-680 2	.0145	.0419	.0146	.1630	.1484	.278	.32	6.6	.0004	.62	.0022	<0.2	8	
680-720 3	.0139	.0402	.0140	.1850	.1710	.320	.36	8.0	.0003	.35	.0020	<0.2	8	
720-760 4	.0125	.0361	.0126	.1800	.1674	.313	.35	8.7	.0004	.30	.0021	<0.2	8	
760-800 5	.0391	.1129	.0395	.3240	.2845	.532	.64	4.7	.0006	.44	.0024	<0.2	10	
800-840 6	.0550	.1589	.0556	.5870	.5314	.994	1.15	6.3	.0038	.39	.0126	0.2	16	
840-880 7	.0236	.0682	.0238	.3680	.3442	.644	.71	9.4	.0006	.42	.0024	0.2	12	
880-920 8	.0378	.1092	.0382	.7600	.7218	1.351	1.46	12.4	.0006	.46	.0084	<0.2	14	
920-960 9	.0385	.1112	.0389	.9230	.8841	1.654	1.76	14.9	.0008	.92	.0037	<0.2	20	
960-1000 10	.0134	.0387	.0135	1.7250	1.7115	3.202	3.24	82.7	.0009	.73	.0054	<0.2	80	
1000-1040 11	.0210	.0607	.0212	.1335	.1123	.210	.27	3.5	.0004	.70	.0042	<0.2	16	
1040-1080 12	.0291	.0841	.0294	1.0390	1.0096	1.889	1.97	22.5	.0012	.49	.0056	0.2	24	
1080-1120 13	.0148	.0427	.0149	.2470	.2321	.434	.48	10.2	.0005	.68	.0021	<0.2	12	
1120-1160 14	.0213	.0615	.0215	.1700	.1485	.278	.34	4.5	.0006	.94	.0042	<0.2	16	
1160-1200 15	.0121	.0350	.0122	.1100	.0978	.183	.22	5.2	.0004	.49	.0044	<0.2	8	
1200-1240 16	.0097	.0280	.0098	.2100	.2002	.375	.40	13.4	.0004	.62	.0015	<0.2	6	
1240-1280 17	.0074	.0214	.0076	.0530	.0454	.085	.11	4.0	.0004	.80	.0016	<0.2	6	
1280-1320 18	.0144	.0416	.0145	.1040	.0875	.168	.21	4.0	.0003	.83	.0034	<0.2	6	
1320-1360 19	.0110	.0318	.0111	.0670	.0559	.104	.14	3.3	.0003	.91	.0025	<0.2	8	
1360-1400 20	.0073	.0225	.0079	.0460	.0381	.071	.09	3.2	.0004	.64	.0018	<0.2	6	
1400-1440 21	.0113	.0326	.0114	.0480	.0366	.068	.10	2.1	.0003	.35	.0123	<0.2	6	
1440-1480 22	.0072	.0208	.0073	.0440	.0367	.069	.09	3.3	.0003	.51	.0039	<0.2	6	
1480-1520 23	.0182	.0526	.0184	.1910	.1726	.323	.38	6.1	.0007	.62	.0019	<0.2	6	
1520-1560 24	.0150	.0433	.0151	.0400	.0249	.047	.09	1.1	.0002	.30	.0032	<0.2	6	
1560-1600 25	.0455	.1314	.0459	.4000	.3541	.662	.79	5.0	.0005	.14	.0140	0.6	10	
1600-1640 26	.0311	.0898	.0314	.7800	.8114	1.518	1.61	16.9	.0004	.28	.0437	0.2	14	
1640-1680 27	.0227	.0656	.0229	.3170	.2941	.550	.62	8.4	.0010	.25	.0086	<0.2	14	
1680-1720 28	.0361	.1043	.0364	.2530	.2166	.405	.51	3.9	.0005	.63	.0091	<0.2	28	
1720-1760 29	.0365	.1054	.0368	.4870	.4502	.842	.95	8.0	.0005	.61	.0048	<0.2	34	
1760-1800 30	.0382	.1103	.0386	.5000	.4614	.863	.97	7.8	.0007	1.17	.0049	<0.2	46	
1800-1840 31	.0248	.0716	.0250	.7250	.7000	1.310	1.38	18.3	.0008	.53	.0038	<0.2	22	
1840-1890	.0562	.1623	.0567	.9930	.9363	1.752	1.91	19.8	.0008	.24	.0063	0.2	14	

AMPAC EFFICIENCY, LINE NO. 6636

CSMC KELVIN PROJECT: HOLE J-4

INTERVAL	ASSAY 1 % Cu	2 wt. % Cp	3 % S in cp.	ASSAY 4 % S	5 % S in py	6 wt. % py	7 TOTAL SULFIDES	8 Py/CP	ASSAY 9 % Mo	10 % Fe_3O_4	ASSAY 11 % Zn	Skyline ASSAY 12 PPM Ag	Skyline ASSAY 13 PPM Co
1880-1920 1	.0686	.1981	.0692	1.8450	1.7758	3.322	3.52	16.8	.0006	.46	.0062	0.2	22
1920-1960 2	.0308	.0890	.0311	1.2150	1.1839	2.215	2.30	24.9	.0030	.29	.0041	<0.2	22
1960-2000 3	.0192	.0554	.0198	.7160	.6962	1.303	1.36	23.5	.0119	.21	.0089	<0.2	20
2000-2040 4	.0271	.0783	.0274	1.3100	1.2826	2.400	2.48	30.6	.0032	.01	.0090	<0.2	20
2040-2080 5	.2568	.7418	.2592	3.7350	3.4758	6.503	7.24	8.8	.0109	2.43	.0047	<0.2	90
2080-2120 6	.0702	.2028	.0708	.8230	.7522	1.407	1.61	6.9	.0072	.22	.0023	<0.2	28
2120-2160 7	.0806	.2328	.0813	.6990	.6177	1.156	1.39	5.0	.0032	.54	.0568	0.2	22
2160-2200 8	.0760	.2195	.0767	1.3110	1.2343	2.309	2.53	10.5	.0075	.10	.0031	0.2	30
2200-2240 9	.0968	.2796	.0977	.9365	.8388	1.569	1.85	5.6	.0094	.09	.0042	0.4	36
2240-2280 10	.0343	.0991	.0346	1.6900	1.6554	3.097	3.20	31.2	.0050	.32	.0078	0.2	95
2280-2320 11	.2471	.7137	.2494	1.7800	1.5306	2.864	3.38	4.0	.0085	2.76	.0156	1.2	80
2320-2360 12	.2138	.6176	.2158	1.3900	1.1742	2.197	2.82	3.6	.0066	3.44	.0050	0.4	60
2360-2400 13	.3852	1.1127	.3888	1.5000	1.1112	2.079	3.19	1.9	.0022	3.87	.0063	0.6	75
2400-2440 14	.3375	.9749	.3406	.8500	.5094	.953	1.93	.98	.0172	.18	.0018	0.6	30
2440-2480 15	.4475	1.2926	.4516	.8900	.4384	.820	2.11	.63	.0211	.09	.0317	0.6	24
2480-2520 16	.1669	.4821	.1684	.4700	.3016	.564	1.05	1.2	.0063	.64	.0035	0.2	28
2520-2560 17	.1396	.4032	.1409	.3655	.2246	.420	.82	1.0	.0094	.35	.0027	0.2	20
2560-2600 18	.1779	.5139	.1795	.2825	.1031	.193	.71	.37	.0082	.19	.0016	0.2	14
2600-2640 19	.0956	.2761	.0965	.3240	.2275	.426	.70	1.5	.0072	.24	.0014	<0.2	18
2640-2680 20	.1406	.4061	.1419	.3820	.2401	.449	.86	1.1	.0064	.21	.0010	<0.2	14
2680-2720 21	.1171	.3382	.1182	.3330	.2148	.402	.74	1.2	.0045	.20	.0011	0.2	16
2720-2760 22	.1450	.4188	.1463	1.3540	1.2077	2.260	2.68	5.4	.0058	.17	.0067	0.2	38
2760-2800 23	.1665	.4809	.1680	.6900	.5220	.977	1.46	2.0	.0049	.30	.0064	0.2	22
2800-2840 24	.1134	.3276	.1144	.7000	.5856	1.096	1.42	3.3	.0050	.19	.0016	<0.2	22
2840-2880 25	.0893	.2579	.0901	.3100	.2199	.411	.67	1.6	.0024	.24	.0015	<0.2	14
2880-2920 26	.0439	.1268	.0443	.3100	.2657	.497	.62	3.9	.0026	.19	.0035	<0.2	20
2920-2960 27	.1505	.4347	.1519	.5000	.3481	.651	1.09	1.5	.0024	.18	.0021	0.2	18
2960-3000 28	.0340	.0982	.0343	.9100	.8757	1.638	1.74	16.7	.0016	.18	.0164	<0.2	26
3000-3040 29	.0423	.1222	.0427	1.0800	1.0373	1.941	2.06	15.9	.0023	.11	.0611	0.2	34
3040-3080 30	.0102	.0295	.0103	.8100	.7997	1.496	1.53	50.7	.0004	.32	.0033	<0.2	10
3080-3104 31	.0113	.0326	.0114	1.0400	1.0286	1.924	1.96	59.0	.0007	.10	.0055	<0.2	14

AMPAD EFFICIENCY® LINE NO. 6636

CSMC Kilns [illegible] J-1
Time Point Weighted [illegible]

Box [illegible]

∠ 0.2 = 0.1
(for comp.)

	1 % Cu	2 % Mo	3 % Zn	4 % S	5 PPM Ag	6 wt % Py	7 Py / Cu	8 PPM Co	9 PPM W	10 Vol % Cp (Cu × 1.8367)	11 Vol % Py (Py × .4531)	12 [illegible]	13 [illegible]
[illegible] 1	.0238	.0004	.0022	.35	.10	.60	8.6	3	4.4	.04	.22	[illegible]	[illegible]
[illegible] 2	.0176	.0004	.0028	.25	.10	.43	[illegible]	[illegible]	4.0		[illegible]	[illegible]	[illegible]
[illegible] 3	.0170	.0004	.0037	.21	.10	.37	7.4	[illegible]	3.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 4	.0224	.0007	.0057	.24	.11	.41	6.8	7	4.6	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 5	.0235	.0013	.0063	.34	.13	.58	[illegible]	11	5.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 6	.0395	.0018	.0073	.46	.16	.78	7.1	[illegible]	6.5	.07	.31	[illegible]	[illegible]
[illegible] 7	.0365	.0014	.0062	.55	.16	.76	8.7	12	6.5	.07	.51	[illegible]	[illegible]
[illegible] 8	.0341	.0009	.0060	.77	.13	1.37	[illegible]	[illegible]	6.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 9	.0301	.0007	.0051	.97	.11	1.75	[illegible]	32	5.8	[illegible]	[illegible]	.71	35.5
[illegible] 10	.0240	.0008	.0050	1.05	.11	1.91	[illegible]	42	5.7	.04	1.02	[illegible]	[illegible]
[illegible] 11	.0220	.0007	.0046	.78	.12	1.42	[illegible]	31	5.5	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 12	.0221	.0008	.0043	[illegible]	.14	[illegible]	[illegible]	[illegible]	5.6	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 13	.0179	.0007	.0037	.31	.12	.79	[illegible]	[illegible]	4.8	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-1160 14	.0174	[illegible]	.0037	.24	.11	.42	[illegible]	13	4.1	[illegible]	[illegible]	[illegible]	[illegible]
1160-1200 15	.0125	[illegible]	.0033	.15	.10	.26	[illegible]	10	3.9	[illegible]	.14	[illegible]	[illegible]
1200-1240 16	.0110	.0004	.0025	.14	.10	.24	[illegible]	[illegible]	3.5	[illegible]	.13	[illegible]	[illegible]
[illegible]-1280 17	.0102	.0004	.0023	.11	[illegible]	.18	[illegible]	[illegible]	3.2	[illegible]	.16	.15	[illegible]
[illegible]-1320 18	.0111	.0003	.0025	.09	[illegible]	.14	[illegible]	[illegible]	3.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-1360 19	.0108	[illegible]	.0032	.07	[illegible]	.11	[illegible]	[illegible]	3.4	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 20	.0098	[illegible]	.0041	.06	.10	.09	[illegible]	6	3.2	[illegible]	[illegible]	.64	[illegible]
[illegible] 21	.0101	.0004	.0064	.06	.10	.09	[illegible]	6	2.8	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-1480 22	.0113	[illegible]	.0055	.08	[illegible]	.13	[illegible]	6	2.7	[illegible]	.07	[illegible]	[illegible]
[illegible]-1520 23	.0165	[illegible]	.0055	.13	[illegible]	.21	[illegible]	6	3.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-1560 24	.0234	.0004	.0105	.22	.22	.37	[illegible]	[illegible]	4.1	.04	[illegible]	[illegible]	[illegible]
[illegible]-1600 25	.0313	[illegible]	.0197	.38	.31	.68	[illegible]	[illegible]	4.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 26	.0316	.0006	.0234	.47	[illegible]	.90	[illegible]	14	4.3	[illegible]	[illegible]	.21	
[illegible] 27	.0305	[illegible]	.0169	.43	.16	.77	[illegible]	13	3.5	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 28	.0367	.0006	.0103	.38	.11	.66	[illegible]	[illegible]	2.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-1760 29	.0343	[illegible]	.0060	.44	.10	.76	[illegible]	23	2.6	[illegible]	[illegible]	[illegible]	[illegible]
1760-1800 30	[illegible]	.0007	.0051	.57	.11	.97	9.0	34	3.2	[illegible]	[illegible]	.72	[illegible]
[illegible] 31	.0374	.0007	.0049	.30	.13	1.43	13.0	[illegible]	4.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-1980	.0445	[illegible]	[illegible]	1.11	[illegible] .14	1.93	[illegible]	[illegible]	5.0	[illegible]	1.25	[illegible]	[illegible]

AMPAD EFFICIENCY® LINE NO. 6636

[illegible]	1 % Cu	2 % Mo	3 % Zn	4 % S	5 PPM Ag	6 wt % Fe	7 % Co	8 PPM Co	9 PPM W	10 [illegible]	11 Vol % [illegible]	12 [illegible]	13 [illegible]
[illegible]1	.0498	.0021	.0055	1.33	.16	2.31	[illegible]	20	6.0	[illegible]	1.34	[illegible]	[illegible]
1720-1760 2	.0385	.0043	.0062	1.32	.13	2.24	20.4	21	6.6	[illegible]	1.19	[illegible]	[illegible]
[illegible]3	.0458	.0069	.0073	1.29	.15	2.32	17.8	26	7.3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]40 4	.0811	.0073	.0071	1.69	.22	3.00	12.5	37	8.8	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-2060 5	.1287	.0078	.0075	2.04	.30	3.57	9.6	49	8.1	.24	1.70	[illegible]	[illegible]
[illegible]-2120 6	.1128	.0068	.0160	1.54	.25	2.67	[illegible]	40	7.9	.21	1.42	[illegible]	[illegible]
[illegible]-2160 7	.0919	.0062	.0235	1.12	.22	1.92	[illegible]	32	7.9	.17	[illegible]	[illegible]	[illegible]
[illegible]-2200 8	.0782	.0067	.0160	1.07	.24	1.86	[illegible]	34	8.6	.14	[illegible]	[illegible]	[illegible]
[illegible]-2240 9	.0579	[illegible]	.0095	1.24	.35	2.16	[illegible]	51	9.6	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 10	.1148	.0071	.0052	1.48	.41	2.56	[illegible]	73	9.6	[illegible]	[illegible]	[illegible]	37.[illegible]
[illegible]-2320 11	.1894	.0048	.0095	1.58	.68	2.60	[illegible]	75	8.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-2360 12	.2567	.0067	.0077	1.49	.63	2.30	3.1	67	7.9	.47	[illegible]	[illegible]	[illegible]
[illegible]-2400 13	.3285	.0056	.0076	1.30	.60	1.81	1.7	[illegible]	8.5	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 14	.3513	.0130	.0101	1.02	.55	1.25	[illegible]	21	10.4	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-2480 15	.3289	.0145	.0141	.77	.48	.86	[illegible]	30	10.8	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-2520 16	.2373	.0116	.0095	.56	.32	.59	[illegible]	[illegible]	9.8	[illegible]	.31	[illegible]	[illegible]
[illegible]-2560 17	.1750	.0073	.0045	.41	.22	.43	[illegible]	27	8.8	.32	.23	[illegible]	[illegible]
[illegible] 18	.1462	.0080	.0019	.33	.17	.35	[illegible]	18	7.8	.09	.17	[illegible]	[illegible]
2600-2640 19	.1360	.0072	.0014	.33	.14	.38	[illegible]	[illegible]	6.0	.04	.30	[illegible]	[illegible]
[illegible]-2680 20	.1280	.0062	.0016	.42	.14	.55	1.5	17	4.6	.24	[illegible]	[illegible]	[illegible]
[illegible]-2720 21	.1311	.0055	.0028	.61	.17	.89	2.3	21	4.5	.24	.47	[illegible]	[illegible]
2720-2760 22	.1408	.0053	.0045	.64	.16	1.31	3.2	26	5.5	.26	.30	.21	[illegible]
[illegible] 23	.1395	.0049	.0046	.79	.14	1.21	3.0	25	5.9	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-2840 24	.1171	.0043	.0032	.60	.13	.95	[illegible]	21	5.0	[illegible]	.30	[illegible]	[illegible]
[illegible]-2880 25	.0950	.0032	.0024	.42	.12	.65	[illegible]	18	4.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 26	.0836	.0026	.0019	.41	.12	.65	2.7	17	4.2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]-2960 27	.0960	.0023	.0102	.56	.15	.92	[illegible]	21	5.3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 28	.0617	.0019	[illegible]	.30	.15	1.38	[illegible]	[illegible]	6.2	.11	[illegible]	[illegible]	[illegible]
[illegible] 29	.0357	[illegible]	.0266	.93	.15	1.67	5.2	24	5.3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 30	[illegible]	[illegible]	.0174	.94	.12	1.73	28.8	15	4.3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 31	.0144	[illegible]	.0107	.72	.11	1.78	44.5	12	3.2	[illegible]	[illegible]	[illegible]	[illegible]

HOLE J-4

		1	2	3	4	5	6	7			1	2	3	4	5	6	7	
		Epidote			Chlorite			Carbonate		Secondary K-spar	Secondary Biotite		Sericite		grainness	CLAY		matrix
1	908.5	rare in groundmass			rare in groundmass			Late wormy vnlts ± in qtz-sulf vnlts		envelopes and qtz-sulf.	aggregates in plag pheno.		aggregates in p pheno	qvnlt.		aggregates		fine ?
2	920	biot → epid common			biot → chl generally					bands	trace ?		mod on outside of plag pheno		minor grainness			
3	968.5									narrow envelope	in groundmass & mafics →		phen → strong		dirty			mixture specks. interstit
4	✓ 1113	accessory interstitial								specks ???	Tr in interstic.							
5	✓ 1123	biot → epid common			biot → chl generally					distinct bands	trace ?		mod on outside of plag	phen	minor grainness			
6	✓ 1196.5				biot → chl, some			in matrix					strong		strong	strong		strong
7	✓ 1657				mafics → chl			in matrix					strong		strong	some		
8	✓ 1770				pyroxene → min chl								minor			weak		
9	✓ 1887				patches in grnms mafics → chl			late veinlets					strong		strong	minor		?
10	✓ 2016							qtz-py-CO_3 vnlt.					rare in k spar & wk-mod plag			minor		
11	✓ 2040				patches in grndms ? mafics → chl			late veinlets + qtz-CO_3-py vnlts.		well def envelopes & qtz-CO_3-sulf vlt	clots		rare in k-spar & wk-mod plag			minor		?
12	✓ 2062							qtz-CO_3-py vnlts		envelopes	mafics	abnt. →	wk-mod			mixture		
13	✓ 2140				Trace			CO_3 vnlts increase plag → min CO_3					rare in k-spar & wk-mod plag			minor		
14	✓ 2227				very rare								plag strong					
15	✓ 2243							patches w/ seric.					strong		coarse			
16	✓ 2286										clots pyrox	some →	wk plag					
17	✓ 2383							minor			strong		rare				rare	
18	✓ 2530	rare			some in groundmass					some rims plag. grains	clusters in groundmass		dusted					
19	✓ 2854	biot-epid weak			biot wk → chlor			rare in grndm		some in veins	some in grndmass		weak					
20	✓ 2968	biot-epid weak			biot wk → chlor			rare in grndm		some in veins	very weak		rare					
21	✓ 3072				mafics → chlor			rare patches					wk-mod					
22																		
23																		
24																		
25																		
26																		
27																		
28																		
29																		
30																		
31																		

AMPAD EFFICIENCY® LINE No. 4636

PROJECT KELVIN DRILL HOLE NO. J-5 SCALE 1" = 100' PAGE NO. 1 OF 2

LENGTH	Cu	Mo	S	calc. wt % sulfide	Py/CP
100					
	.2126	.0246			
200					
300					
400					
500					
600					
700					
		.1684			

Mineralization & Miscellaneous

0-1400 drilled by Tipperary Resources in March 1970 and designated the hole T-1.

C.S.M.C. re-entered the hole on 3/24/77 and designated the hole J-5.

Information for interval 0-1400 from Tipperary Logs.

HOLE SIZE:
0-1400: 6 5/8" (?) rotary
1400-1554: NX wireline core
1554-2825: BX wireline core

COLLAR:
elevation: ~ 2170 feet
inclination: −90°
location: 125' FSL & 300' FEL of section 8, T. 4 S., R. 13 E., Pinal County, Arizona.

DRILLING CONTRACTOR:
JOY MANUFACTURING CO. (1400-2825).

CASING LEFT IN HOLE:
6 5/8" : 0-52'
NX (100 feet): 1300-1400 feet (cut at 1350 feet).
A steel plate is welded to the top of the 6 5/8" casing.

DRILLING & COST DATA:

Average footage/shift	= 18.5
Direct Drilling Cost	= 14.07/ft.
Mud, additives, water	= 1.89/ft.
Reaming, excess bits	= 1.60/ft.
Casing, time & left in hole	= 2.73/ft.
Assaying	= 1.08/ft.
Splitting	= 0.36/ft.
Mobilization	= 1.11/ft.
Thin sections	= .14/ft.
(1425') TOTAL	= 22.98/ft.

Trace copper oxides 460-470

Trace native copper {235-240, 880-890}

Summary Lithology & Alt...

0-34: Quaternary alluvium: unconsolidated medium to coarse grained with fragments of oracle granite, diabase, diorite and quartz.

34-144: Precambrian Oracle Granite

144-153: Precambrian Diabase: black diabase dike with stringers of quartz with pyrite & chalcopyrite

153-232: Precambrian Oracle Granite

232-918: Paleocene Teacup Granodiorite: from verbal description by Tipperary this unit is composed of 62% quartz, 17% plagioclase, 5% K-feldspar, 7% biotite and 7% chlorite. From this description and later drilling by Cyprus (core hole KE-1 drilled in 1972) it seems probable that this unit is the Teacup Granodiorite of the U.S.G.S. (Grayback Granodiorite of Schmidt). Note K-feldspar = 23% of total feldspar).

PROJECT KELVIN DRILL HOLE No. J-5 SCALE [illegible] PAGE NO. [illegible] OF 4

LENGTH	% Fe_3O_4 (comp.)	ASSAYS (%) Cu	Mo	S	calc. wt % sulfide	Py/Cp	Mineralization & Miscellaneous	Chalcopy	Pyrite	Molybdenum	STRUCT.	ROCK	Summary Lithology & [illegible]
		.3905	.0368				Intercept may be related to the Johnson molybdenum vein structure.						
800													
900													918-1400: Precambrian Oracle Granite
													trace kaolinite
1000													
1100							trace sphalerite						
1200							trace bornite						
1300													
1400	0.18	.0226	.0015	.0722	.158	1.4	.0274 Zinc						1400-1490: Precambrian Oracle Granite: porphyritic quartz monzonite with numerous pink K-spar phenocrysts up to 1.5 inch in length (generally euhedral, generally euhedral plagioclase phenocrysts [illegible] 0.25 [illegible] in diameter in a coarse to medium grained groundmass of quartz, K-spar, plagioclase, biotite and minor magnetite and hornblende.
1500													

PROJECT KELVIN DRILL HOLE NO. J-5 SCALE 1"=100' PAGE NO. 3 OF 4

LENGTH	ASSAYS (%) Cu	Mo	S	Cu/total sulfide	Py/Cp
1700	0.97	.0512	.0024	.1665	.363	1.5
1800						
1900	5.27	.0980	.0024	.3465	.746	1.6
2000	3.24	.3309	.0047	.7892	1.808	0.89
2100						
2200						

Mineralization & Miscellaneous

.0079 Zinc

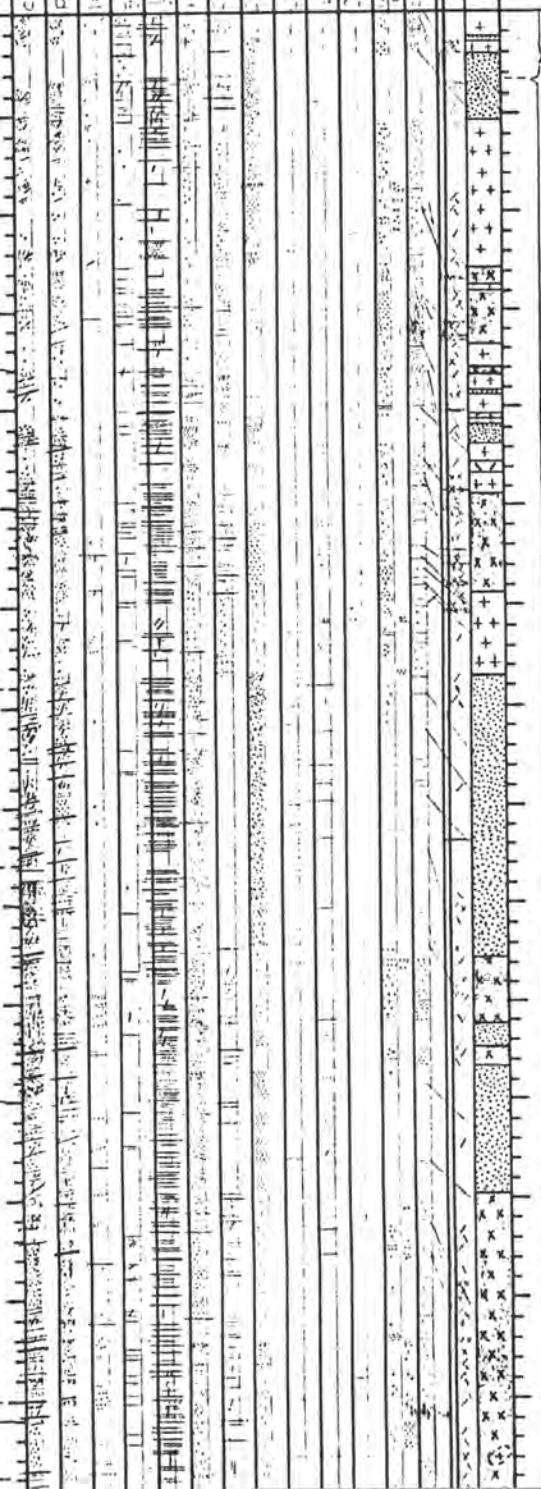
1630-2200 = 520 feet = 2.961 % magnetite compared to 0.432 above & 0.514 below

1840-2240 = 400 feet =
.2619 % Copper
.0042 % Molybdenum
.2829 % Copper Equivalent
1.483 total Sulfides (wt)
0.876 (vol.). Py:Cp = 0.96:1

1930-2050 = 120 feet =
.4192 % Copper
.0036 % Molybdenum
.4372 % Copper equivalent
(based on 3 replicate assays)

1930-2210 = 280 feet =
.3121 % Copper
.0039 % Molybdenum
.3316 % Copper equivalent

1.4 ppm Silver compared to less than 0.2 ppm above and below.



1514-1516, 1520½-1554 } Precambrian Sierra [illegible] diabasic texture [illegible]

SILICITIC ALTERATION ASSEMBLAGE (%): plagioclase altered 60% to sericite - trace kaolin, quartz & epidote. Mafics [illegible] 70% to chlorite & 25% to magnetite, K-spar altered 5% to chlorite & trace sericite & [illegible]

1493-1514, 1516-1520½, 1554-1629, 1637½-1640, 1669-1680, 1685-1692, 1694-1704, 1706-1709, 1719-1723, 1733-1745, 1794-1836 } Precambrian Oracle Granite

This assemblage may be biotite offset by the strong chlorite present. Another minor phase of Potassic assemblage below - 2nd biotite & epidote gen. absent.

1704-1706, 1728-1733 } Paleocene Teacup Granodiorite [illegible] description below.

1692-1694, 1704-1719, 1836-1977, 2012-2024, 2033-2099½ } Precambrian Diabase: very fine-grained, highly magnetic, diabasic texture [illegible] locally intrusive.

POTASSIC ALTERATION ASSEMBLAGE: In general plagioclase in intermediate rocks altered 50% to sericite, 10% to K-spar, 5% to biotite, plagioclase in diabase altered 20% to sericite, 15% to biotite and 10% to actinolite. Mafic minerals in intermediate rocks altered 70% to chlorite, 25% to biotite & 5% to magnetite; mafic minerals in diabase altered 30% to biotite, 15% to actinolite and to chlorite. Secondary biotite (probably associated with magnetite) is common in the matrix of all rocks. It appears that a biotite-magnetite-quartz assemblage is common in the diabase while a chlorite-secondary K-spar assemblage is common in the intermediate rocks. Some chlorite may be due to a later stage. [illegible] Primary K-spar throughout the interval generally fresh to minor recrystallization to secondary K-spar to "dusted" with sericite, quartz, chlorite or biotite. Epidote & zeolite common at center of zone (late [illegible]

1629-1637½, 1640-1669, 1680-1685, 1745-1794, 1777-2012, 2024-2033, 2099½-2133 } Tertiary-Cretaceous Granodiorite Porphyry [illegible] contacts up to 0.25" in a medium [illegible] groundmass of plagioclase [illegible] biotite, magnetite and [illegible] K-spar [illegible] chlorite. & the typical equigranular to slightly porphyritic texture is absent.

PROJECT KELVIN DRILL HOLE NO. L1-5 SCALE 1" = 100' PAGE NO. 4 OF 4

LENGTH	% Cu	ASSAYS (%) Zn	Mo	S	Cu/Zn wt %	Fe/Cu
2000	0.58	.0738	.0055	.1960	.441	1.1
2400	1.16	.0870	.0032	.3641	.768	2.1
2600	0.20	.0310	.0022	.0730	.168	0.87

Mineralization & Miscellaneous

Zone of high Cobalt = 43 ppm compared to 17 ppm above & 18 ppm below. 1840-2200 = 60 ppm.

.0168 Zinc

.0045 Zinc

completed 27 April 1977

2825' is total length

1400-2825: LOGGED BY: J. P. VROMAN

STRUCT. ROCK

2254½-2315
2315½-2321
2321½-2332½
2332½-2337½
2337½-2341
} Precambrian Oracle Granite

315-2318
2321½-2322½
2324-2332
2337½-2334½
2352-2355
2357-2359
2362-2367
2413-2424
} Tertiary-Cretaceous Granodiorite Porphyry

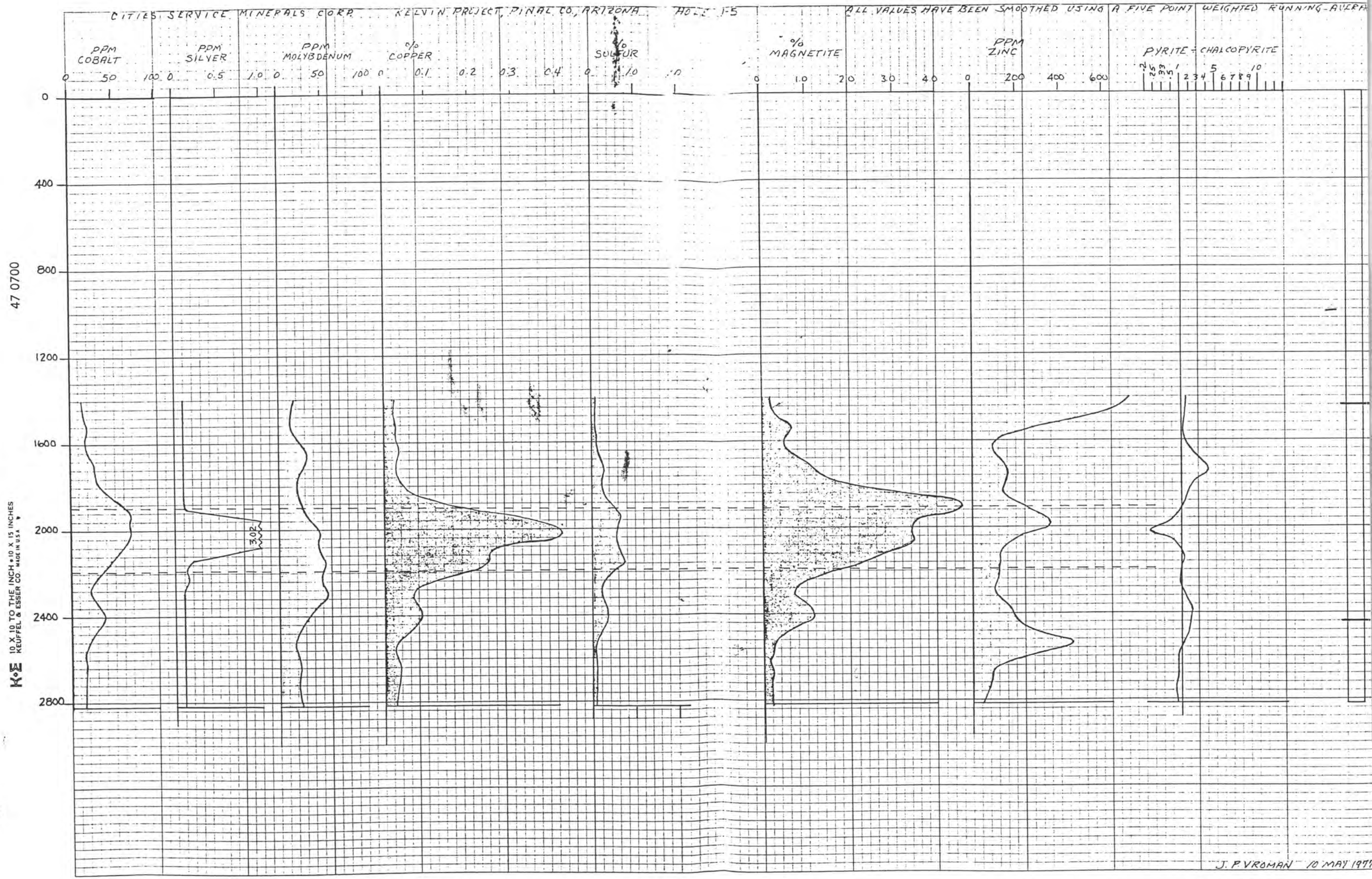
2341-2352
2355-2357
2359-2362
2367-2413
2424-2435
} Tertiary-Cretaceous Metasomatic Rhyodacite Porphyry: approximately 20 percent phenocrysts, 5% (in order of decreasing abundance) euhedral plagioclase up to 10 mm; rounded quartz to ½ mm; and biotite (hornblende and/or biotite) up to 3 mm, in a matrix of the same minerals + K-feldspar + magnetite averages 0.5 vol. percent.

2435-2440 - Precambrian Diabase

2440-2475½ - intimate mixture of Precambrian Oracle Granite, Precambrian Diabase, Tertiary-Cretaceous Teacup Granodiorite, & Tertiary-Cretaceous Granodiorite Porphyry III - Fault zone with important movement.

PROPYLITIC ALTERATION ASSEMBLAGE: Overall plagioclase is altered 15% to sericite & 10% to clay minerals - a trace of secondary K-spar & carbonate is sometimes present in fracture fillings. Original K-feldspar is fresh with very rare localization to secondary K-spar or replaced by quartz. Over 50% of the mafic minerals are altered to chlorite. The iron oxides are largely pyrite is common in very small amounts & interstitial to secondary K-spar. No secondary sulfide seen. Magnetite content is 1%.

2475½-2825: Paleocene Teacup Granodiorite: porphyritic with phenocrysts of euhedral to subhedral light-colored plagioclase up to 0.4 inch in length, prominent light-gray anhedral quartz averaging 0.3 inch (up to 0.6 inch) in a medium-grained groundmass of the same minerals, euhedral biotite up to 0.1 inch, hornblende up to 0.05 inch and probable interstitial K-spar. Fresh specimens are light gray to nearly white in overall color.


CITIES SERVICE MINERALS CORP. KELVIN PROJECT, PINAL CO., ARIZONA HOLE F-5
ALL VALUES HAVE BEEN SMOOTHED USING A FIVE POINT WEIGHTED RUNNING-AVERAGE
PPM COBALT
PPM SILVER
PPM MOLYBDENUM
% COPPER
% SULFUR
% MAGNETITE
PPM ZINC
PYRITE - CHALCOPYRITE
0
400
800
1200
1600
2000
2400
2800
3.02
47 0700
K+E 10 X 10 TO THE INCH • 10 X 15 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.
J. P. VROMAN 10 MAY 197

AMPAD EFFICIENCY LINE NO. 6636

HOLE J-5 REPLICATE SAMPLES

INTERVAL	1 SAMPLE	% COPPER 2 American Analytical	3 Skyline	4 Rocky Mtn	5	6	7	PPM MOLYBDENUM 8 American Analytical	9 Skyline	10 Rocky Mtn	11	12	13
1930-1940 1	J5-194	.51	.49	.58	.		.50	42	10	13			
1940-1950 2	-195	.61	.16	.57	.		.59	31	30	21			
3	196	.53	.57	.47	.		.52	26	16	17			
4	197	.21	.54	.14	.		.18	37	18	19			
5	198	.34	.32	.33			.33	25	12	19			
6	199	.24	.19	.20			.21	47	46	50			
1990-2000 7	200	.20	.20	.22			.21	60	34	34			
8	201	.61	.37	.41	.		.39	79	16	39			
9	202	.23	.25	.25			.24	36	14	14			
10	203	.36	.44	.33	.	M	.38	107	120	93			
11	204	1.44	.98	.84	.	M	1.09	21	20	18			
2040-2050 12	205	.41	.38	.38			.39	40	32	29			
13	206	.19	.26	.23			.23	87	50	48			
14	207	.16	.14	.11			.14	26	30	8			
15	208	.11	.15	.20	.		.15	11	2	3			
16	209	.04	.03	.04			.04	17	2	3			
2070-2100 17	210	.14	.19	.13	.		.15	42	42	23			
18	211	.20	.18	.18			.19	25	12	12			
19	212	.11	.08	.10			.10	27	8	9			
20	213	.27	.41	.41	.		.41	54	38	34			
21	214	.46	.29	.27	.		.28	171	145	113			
2140-2150 22	215	.41	.46	.47	.		.46	38	28	32			
23	216	.20	.20	.23			.21	31	22	33			
24	217	.33	.35	.32			.33	67	48	80			
25	218	.33	.41	.30	.		.32	47	42	37			
26	219	.23	.21	.18			.21	34	14	18			
2190-2200 27	220	.19	.22	.29	.		.20	62	56	105			
2200-2210 28	221	.21	.24	.31	.	M	.29	45	40	49			
29		6.1%	0.3%	2.9%									
MEAN 1930-2210 30	25 .329	.3311	.3111	.3032	8%		.3121	48	34	35			
MEAN 1930-2050 31	23 .434	.4742	.4075	.3933	17%		.4192	46	31	30			
		13.1%	2.8%	6.2%									

AMPAD EFFICIENCY LINE NO. 6636

1840 - 2240 = .3619 + 4 [illegible]

* SKYLINE ASSAY

CSMC KELVIN PROJECT : HOLE J-5

INTERVAL	ASSAY 1 % Cu	Cu x 2.8885 2 wt.% cp.	Cu x 1.00925 3 % S in Cp	ASSAY 4 % S	#4 minus #3 5 % S in py	#5 x 1.8709 6 wt. % py	py + cp 7 TOTAL SULFIDES	8 py/cp	ASSAY 9 % Mn	10 % Fe_3O_4	ASSAY 11 % Zn	* ASSAY 12 PPM As	** ASSAY 13 PPM C
1400-1440 1	.0268	.0774	.0270	.0895	.0625	.1169	.194	1.5	.0027	.266	.0366	< 0.2	14
1440-1480 2	.0205	.0592	.0207	.0680	.0473	.0885	.148	1.5	.0008	.096	.0366	< 0.2	14
1480-1520 3	.0204	.0589	.0206	.0590	.0384	.0718	.131	1.2	.0014	.178	.0242	< 0.2	14
1520-1560 4	.0318	.0919	.0321	.1065	.0744	.1392	.231	1.5	.0011	1.295	.0121	< 0.2	32
1560-1600 5	.0237	.0685	.0239	.0230	—	—	.068	—	.0014	.414	.0024	< 0.2	12
1600-1640 6	.0419	.1210	.0423	.1640	.1217	.2277	.349	1.9	.0036	.296	.0040	< 0.2	14
1640-1680 7	.0470	.1358	.0474	.1705	.1231	.2303	.366	1.7	.0036	.482	.0047	< 0.2	20
1680-1720 8	.0510	.1473	.0515	.2010	.1495	.2797	.427	1.9	.0034	1.423	.0057	< 0.2	34
1720-1760 9	.0678	.1958	.0684	.3680	.2996	.5605	.756	2.9	.0017	1.040	.0111	< 0.2	28
1760-1800 10	.0971	.2805	.0980	.1155	.0175	.0327	.313	.12	.0024	1.509	.0086	< 0.2	30
1800-1840 11	.0490	.1415	.0495	.1835	.1340	.2507	.392	1.8	.0018	1.303	.0040	< 0.2	28
1840-1880 12	.1066	.3079	.1076	.3280	.2204	.4123	.720	1.3	.0027	5.184	.0089	< 0.2	58
1880-1920 13	.0894	.2582	.0902	.3650	.2748	.5141	.772	2.0	.0021	5.354	.0076	< 0.2	70
1920-1960 14	.4475	1.2926	.4516	.9560	.5044	.9437	2.236	.73	.0031	4.512	.0118	< 0.2	74
1960-2000 15	.2475	.7149	.2498	.5040	.2542	.4756	1.190	.67	.0042	2.412	.0292	0.3	56
2000-2040 16	.6775	1.9570	.6838	1.3800*	.6962	1.3025	3.260	.67	.0061	3.280	.0097	7.5	77
2040-2080 17	.2175	.6282	.2195	.6545	.4350	.8138	1.442	1.3	.0041	4.403	.0077	0.2	68
2080-2120 18	.1230	.3553	.1241	.3650	.2409	.4507	.806	1.3	.0028	3.023	.0064	< 0.2	50
2120-2160 19	.3341	.9650	.3372	1.1450	.8113	1.5179	2.483	1.6	.0074	1.890	.0062	0.3	42
2160-2200 20	.2693	.7779	.2718	.5200	.2482	.4644	1.242	.60	.0052	3.164	.0054	0.2	43
2200-2240 21	.1065	.3076	.1075	.3100	.2025	.3789	.686	1.2	.0042	.738	.0072	< 0.2	26
2240-2280 22	.0723	.2088	.0730	.1560	.0830	.1553	.364	.74	.0037	.708	.0055	< 0.2	24
2280-2320 23	.0425	.1228	.0429	.1220	.0791	.1480	.271	1.2	.0087	.288	.0030	< 0.2	14
2320-2360 24	.0927	.2678	.0936	.3400	.2464	.4610	.729	1.7	.0031	1.496	.0063	< 0.2	34
2360-2400 25	.0771	.2227	.0778	.3260	.2482	.4644	.687	2.1	.0033	.682	.0105	< 0.2	38
2400-2440 26	.1098	.3172	.1108	.5960	.4852	.9078	1.225	2.9	.0044	1.793	.0096	< 0.2	42
2440-2480 27	.0685	.1979	.0691	.1945	.1254	.2346	.433	1.2	.0019	.680	.0103	< 0.2	30
2480-2520 28	.0329	.0950	.0332	.1320	.0988	.1848	.280	1.9	.0018	.188	.0060	< 0.2	20
2520-2560 29	.0182	.0525	.0184	.0465	.0281	.0526	.105	1.0	.0014	.163	.0476	< 0.2	18
2560-2600 30	.0163	.0471	.0165	.0440	.0275	.0514	.099	1.1	.0022	.256	.0075	< 0.2	16
2600-2640 31	.0540	.1560	.0545	.1055	.0510	.0954	.251	.61	.0026	.202	.0070	< 0.2	18

AMPAD EFFICIENCY, LINE NO. 6636

	ASSAY			ASSAY					ASSAY		ASSAY	ASSAY	ASSA
	1 % Cu	2 wt % cp	3 % S in cp	4 % S	5 % S in py	6 wt % py	7 TOTAL SULFIDES	8 py/cp	9 % Mo	10 % Fe_3O_4	11 % Zn	12 PPM Ag	13 PPM C
2640-2680 1	.0387	.1118	.0391	.0835	.0444	.0831	.195	.74	.0022	.252	.0036	<0.2	18
2680-2720 2	.0339	.0979	.0342	.0770	.0428	.0801	.178	.82	.0022	.179	.0039	<0.2	18
2720-2760 3	.0339	.0979	.0342	.0580	.0238	.0445	.142	.45	.0020	.158	.0047	<0.2	16
2760-2800 4	.0265	.0765	.0267	.0535	.0268	.0501	.127	.65	.0024	.245	.0026	<0.2	16
2800-2825 5	.0248	.0716	.0250	.0570	.0320	.0599	.132	.84	.0027	.200	.0021	<0.2	18
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AMPAD EFFICIENCY LINE NO. 6636

CSMC KELVIN PROJECT: HOLE J-5

5pt weighted running average

Interval

value = $\frac{1X + 3X + 5X + 3X + 1X}{13}$

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5 PPM Ag	6 wt. % py	7 py/cp.	8	PPM Co	10 Vol % Cp. (Cu x 1.8363)	11 Vol % pyrite (wt py x 0.532)	12 Vol % Fe_3O_4	13 Mc
1400-1440 1	.0239	.0016	.0352	.0789	<0.2	.1025	1.5		14.	.0439	.0545	.200	4.5
1420-1460 2	.0230	.0013	.0315	.0743	<0.2	.0956	1.4		16.	.0422	.0509	.259	5.3
1480-1520 3	.0238	.0013	.0235	.0716	<0.2	.0890	1.3		18.	.0437	.0473	.442	8.0
1520-1560 4	.0272	.0014	.0139	.0797	<0.2	.0940	1.2		20.	.0499	.0500	.665	11.5
1560-1600 5	.0305	.0020	.0069	.0889	<0.2	.1087	1.2		18.	.0560	.0578	.577	10.4
1600-1640 6	.0355	.0029	.0045	.1314	<0.2	.1788	1.7		18.	.0652	.0951	.530	10.4
1640-1680 7	.0362	.0032	.0051	.1799	<0.2	.2682	2.6		22.	.0665	.1427	.694	13.5
1680-1720 8	.0344	.0030	.0068	.2231	<0.2	.3524	3.5		28.	.0632	.1875	1.037	19.3
1720-1760 9	.0320	.0024	.0082	.2418	<0.2	.3920	4.2		29.	.0588	.2085	1.214	22.2
1760-1800 10	.0395	.0022	.0079	.2124	<0.2	.3228	2.8		32.	.0725	.1717	1.629	28.1
1800-1840 11	.0568	.0022	.0072	.2293	<0.2	.3217	2.0		39.	.1043	.1711	2.538	42.2
1840-1880 12	.1079	.0024	.0081	.3352	<0.2	.4234	1.4		53.	.1981	.2252	3.993	66.2
1880-1920 13	.1843	.0026	.0110	.4896	.12	.5680	1.1		64.	.3384	.3022	4.583	78.4
1920-1960 14	.3102	.0033	.0149	.6302	.72	.5933	.66		68.	.5696	.3156	4.179	76.0
1960-2000 15	.3784	.0042	.0175	.6031	1.89	.4138	.38		67.	.6949	.2201	3.476	65.9
2000-2040 16	.4118	.0047	.0136	.5526	3.02	.2563	.22		68.	.7561	.1364	3.414	64.6
2040-2080 17	.3131	.0045	.0094	.5730	1.81	.4808	.53		63.	.5749	.2558	3.479	64.6
2080-2120 18	.2474	.0046	.0068	.6324	.75	.7160	1.0		54.	.4543	.3809	3.111	59.2
2120-2160 19	.2440	.0053	.0063	.7188	.21	.8841	1.3		45.	.4481	.4703	2.550	52.0
2160-2200 20	.2202	.0052	.0061	.5758	.13	.6615	1.0		38.	.4044	.3519	2.110	43.0
2200-2240 21	.1488	.0049	.0060	.3727	.14	.4163	.97		30.	.2732	.2215	1.345	27.6
2240-2280 22	.0900	.0050	.0054	.2258	.11	.2525	.97		24.	.1653	.1343	.868	17.5
2280-2320 23	.0685	.0055	.0052	.2103	<0.2	.2641	1.3		24.	.1258	.1405	.729	14.9
2320-2360 24	.0773	.0046	.0067	.2843	<0.2	.3859	1.7		30.	.1419	.2053	.992	20.1
2360-2400 25	.0849	.0038	.0087	.3657	<0.2	.5239	2.1		36.	.1559	.2787	1.096	23.0
2400-2440 26	.0855	.0033	.0094	.3626	<0.2	.5169	2.1		36.	.1570	.2750	1.133	23.5
2440-2480 27	.0666	.0025	.0120	.2715	<0.2	.3822	2.0		30.	.1223	.2033	.784	16.6
2480-2520 28	.0424	.0020	.0170	.1556	<0.2	.2111	1.7		23.	.0779	.1123	.424	9.2
2520-2560 29	.0278	.0018	.0228	.0816	<0.2	.1002	1.2		19.	.0510	.0533	.233	5.1
2560-2600 30	.0284	.0021	.0162	.0685	<0.2	.0745	.91		17.	.0522	.0396	.217	4.6
2600-2640 31	.0375	.0023	.0092	.0795	<0.2	.0779	.72		18.	.0689	.0414	.152	3.9

AMPAD EFFICIENCY LINE NO. 6636

	1 % Cu	2 % Mo	3 % Zn	4 % S	5 PPM Ag	6 wt.% py	7 py/cp	8	9 PPM Co	10 vol % cp.	11 vol % pyrite	12 vol. % Fe_3O_4	13 Me
2640-2680 1	.0390	.0023	.0048	.0821	<0.2	.0800	.73		18.	.0716	.0426	.205	4.8
2680-2720 2	.0360	.0022	.0042	.0745	<0.2	.0714	.69		17.	.0661	.0380	.198	4.5
2720-2760 3	.0319	.0022	.0037	.0632	<0.2	.0580	.63		17.	.0586	.0307	.193	4.2
2760-2800 4	.0285	.0024	.0031	.0575	<0.2	.0538	.65		17.	.0523	.0286	.206	4.3
2800-2825 5	.0264	.0025	.0026	.0559	<0.2	.0547	.72		17.	.0485	.0291	.210	4.3
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AMPAD EFFICIENCY LINE NO. 6636

THIN SECTION SUMMARY HOLE J-5

		PHENOCRYSTS																					COMMENTS
		PLAGIOCLASE							K- FELDSPAR					MAFICS									
DEPTH	ROCK	ser.	qtz	clay	CO_3	K-spar	biot.	actin	chl.	ser	qtz	sec. K-sp	chl	other	chl	biot	actin	mag.	rut.	leuc	other	11	12	13	
1403	Yr 1	50	10			10	matrix biot.		2		1	3	5		60			40							
1460	Yr 2	70				20			Tr	2	2		3	3-CO_3	60			30							
1495	Yr 3	50	?	?					2	1	3	?	1.0	15-chl	90			10							abundant (10-15%) chlorite
1545	db 4							35								90		10							10% quartz (secondary?)
1553	Yr 5	Tr		✓		15		30			?		5	clay	90			✓							qtz-chl vnlt in Yr becomes qtz-biot in db.
1553	db 6		✓					70								90		10							qtz-biot rock w/ microgranite
1606	Yr 7	60			4	8		10				?			30	60		8							chl. in matrix may have been bio
1631	III 8	90													100										much k-spar may be second
1654	III 9	80	10						Tr						100										seric. & second. k-spar in matrix.
1690	Yr 10	65				5			10		3		3		100			✓		✓	py				
1715	db 11	8														?	?	5							
1728	Ttc 12	80				8			5		Tr		Tr	Tr-CO_3	100			✓		✓					
1733	Yr ? 13	70				5			8						100			✓		✓	py				
1749	III 14	✓	✓												✓					✓	py				Texture destroyed: qtz-seric.-chl-biot.-py-leucox-k-spar.
1764	III 15	35						Tr	5							100		✓		✓					locally biot 100% → chl. abdt. sec. biot in matrix
1799	Yr 16	20						20	Tr	10	20			20-b	20	80									
1816	Yr 17	60				10			Tr	Tr			Tr		100			✓		✓					
1844	db 18	15														5									
1882	db 19	40						20	Tr							✓	50								biot. is prob. 2nd after actinolite
1921	db 20								50								10	✓			2nd K off. pyr				
1967	db 21							5	5							✓	50	✓							pyroxene 50 → actinolite 80 → biot & mag
1989	III 22	80				12			5						100										sec. K-spar in matrix
2031	III 23	90				5			Tr						100			✓			py				see K-spar & biot in mat.
2038	db 24	60						20	5							50	10								sec. biot - 30% added. Tr. K-spar.
2079	db 25	40															15								
2096	db 26							10	20							55	15								biot-mag-sulfide added.
2104	III 27	35				5									2			✓							10% biot added to matrix ~5% chlorite
2135	III 28	20	20						Tr						100			✓		✓					biot → chl near K-spar-py 10% biot added
2148	III 29	10	15		4	55			Tr						100			✓		✓					K-spar in matrix 5% chl after 2ry biot in matrix
2204	III 30	12				10		2	Tr							100		✓		✓					sec. K-spar & biot in matrix
2250	III 31	80	Tr					10								100		✓							sec. biot + K spar, tr. in mat.
2265	Yr	50				5			40	5	5		5	Tr CO_3	30						50-m.?				dk. olive green all of plag. seric. chl-qtz
2282	Yr	68	7			15			10			✓	2		100										abdt 2ry biot & chl in matrix
2352	Tmr	40						7	10						70			20	10						
2382	Tmr 1	80	5			10			Tr						100										do. w/ sec. biot → chl 20% chl in mat. after 2ry biot
2431	Tmr 2	15						10							100			✓							
2435	db 3	40		Tr ?											40	50		✓							abdt 2ry biot going to chl
2454	Tmr 4	20		40 ?											100			✓			Tr CO_3				biot & chl in matrix
2485	Ttc 5	15		3											100					✓					
2497	Ttc 6	6													100					✓					
2536	Ttc 7	5		Tr											Tr						Tr Epid				
2588	Ttc 8	5				5									55										
2600	Ttc 9			25											55										matrix plag → chl mafic → chl
2660	Ttc 10	50	←	30 →											100				✓						" plag → seric
2691	Ttc 11	11													45						Tr. CO_3 Epid				
2716	Ttc 12	50			10										95				✓	✓					
2737	Ttc 13			20							Tr (deuteric?)				12										FRESH ROCK ?
2768	Ttc 14	15		15	5										100				✓	✓					
2780	Ttc 15	5		15											10										
2873	Ttc 16														10						Tr Epid				
		(11)		(10)																					

FRESH ROCK

PROJECT KELVIN DRILL HOLE NO. 1-6 SCALE 1" = 100' PAGE NO. 1 OF 4

LENGTH	Depth (ft)	Cu	Mo	S	Calc. wt % sulfide	Py/Cp
	150.0					
	60.0					
	51.4					
	40.2					
	40.2					
	52.5					
	43.8					
100	47.2					
	48.7					
	63.4					
	60.0					
	51.4					
	43.8					
	59.1					
	37.4					
	55.0					
	35.0	.0037	.0006	.0348	.069	5.4
200	41.6					
	50.0					
	43.8					
	50.0					
	50.0					
	51.4					
	40.2					
	55.0					
	37.5					
	37.5					
300	37.5					
	40.8					
	36.6					
	17.5					
	17.6					
	24.4					
	46.4					
	100.0					
	58.3	.0029	.0005	1.7900	3.344	398.0
	70.1					
400	39.0					
	38.1					
	19.5					
	33.8					
	29.2					
	29.2					
	52.2	.0033	.0005	.0760	.146	14.3
	26.0					
	35.4					
	29.4					
500	35.4					
	24.0					
	18.6					
	40.0					
	14.6					
	14.3					
	9.2					
	7.2					
	5.0	.0067	.0009	.0732	.144	6.4
	3.0					
600	12.7					
	24.6					
	10.0					
	17.8					
	60.0					
	51.4					
	55.0					
	60.0					
	47.2					
	54.5					
700	45.0					
	32.6					
	36.6					
	39.4					
	40.0	.0032	.0005	.0655	.126	12.7
	72.0					

DRILLING RATE (minutes/foot) 1 2 3 4 5 6 7 8 9 10

DRILLING-MISCELLANEOUS

begin drilling with air hammer 5:15 P.M. 4 APR 77

minor water in hole after sitting one hour.

first water

start Tricone-Air

2 hrs 00 min

0 hrs 51 min

4 hrs 26 min

2 hrs 05 min

LITHOLOGY, ALTERATION & INTERVAL [illegible]

0-720: Precambrian Granite: see description below; a significant amount of the [illegible] 0-940 may be brecciated.

PROPYLITIC ALTERATION ASSEMBLAGE: overall plagioclase altered 50% to sericite, 2% to epidote, 1% to secondary K-spar, 1% to chlorite; Primary K-feldspar is altered 35% to secondary K-spar, 2% to chlorite, 2% to sericite plus a trace of epidote; mafic minerals altered 15% to chlorite and 15% to epidote. No secondary biotite noted. Zone contains: .0035% copper, .0006% molybdenum, .334% (weight) total sulfides and has a pyrite + chalcopyrite ratio = 33. Zinc = .0476% compared to .0177% in the interval 520-640 feet, .0394 in the interval 640-1600 feet and .0574 in the interval 1600-1760 feet. Some of the "white sericite" alteration of plagioclase logged in the interval 0-920 may actually be montmorillinite see test below.

← montmorillinite test: 80% of sample positive

← pyrolusite dendrites present

[illegible] fault zone with [illegible] particles are strongly stained & often [illegible] limonite.

17 ppm cobalt (compared to 12 ppm above this zone and 12 ppm in the interval 640-1600 feet may be comparable with interval [illegible]

720-[illegible]: [illegible] Porphyry (?):

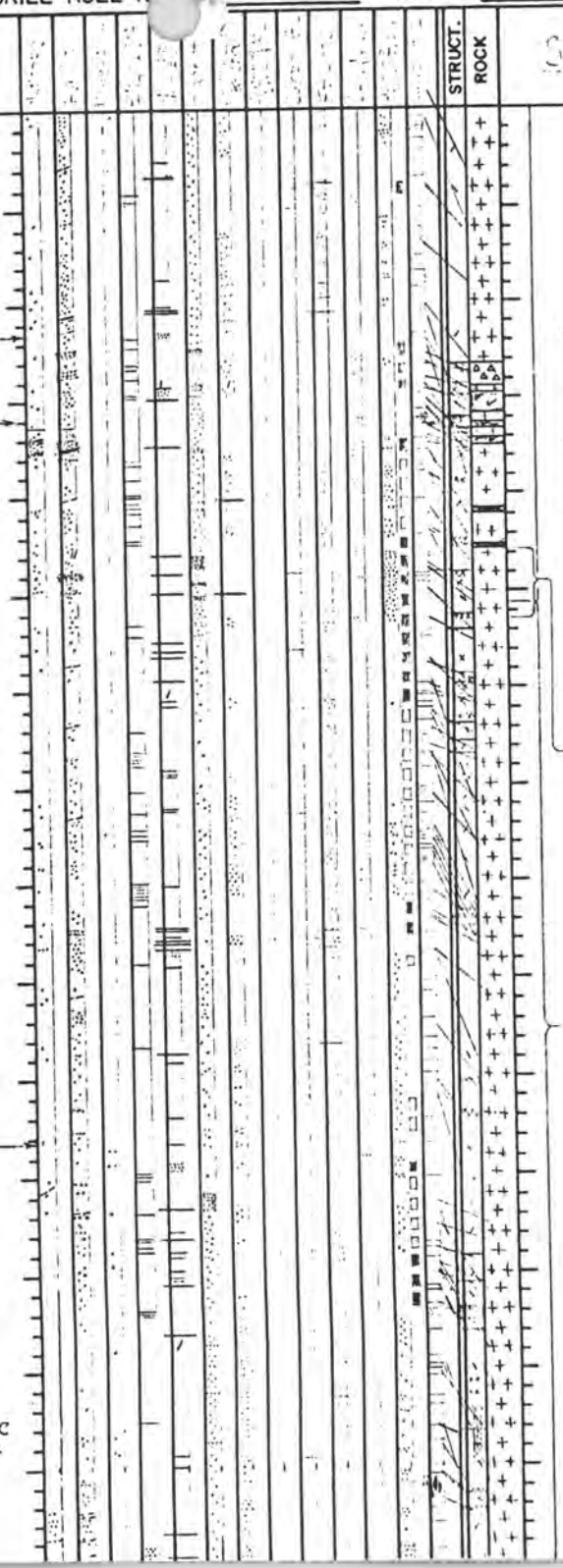
PROJECT KELVIN DRILL HOLE NO. J-6 SCALE 1" = 100' PAGE NO. 2 OF 4

LENGTH	Drilling Rate (ft/hr)	Cu	Mo	S	Calc. wt.% sulfide	Py/cp	DRILLING RATE (minutes/foot) / DRILLING-MISCELLANEOUS	LITHOLOGY, ALTERATION, INTERPRETATION
800	75.0, 51.4, 51.4, 31.6, 46.6, 15.4, 30.3, 23.1, 13.9						begin tricone & mud	
900	19.4, 15.8, 9.7, 8.9, 5.8, 9.2, 17.8, 15.9, 18.3, 20.0, 17.8, 22.2	.0028	.0004	.2048	.386	46.7		[illegible]
1000	0.87	.0044	.0017	.5210	.979	74.9	end rotary - begin core drilling	740-1633: *Precambrian Granite*: porphyr[illegible] quartz monzonite with [illegible] pink, [illegible] k-sp[illegible] phenocrysts up to 1.5 inch in length; plagioclase crystals, general [illegible] euhedral up to 0.25 [illegible] in diameter, in a coarse to medium-grained ground[illegible] [illegible] quartz, [illegible] plagioclase, biotite, minor magnetite and hornblende.
1100	0.53	.0056	.0005	.0562	.111	5.8		
1200	0.53	.0034	.0006	2.4760	4.626	472.0		[illegible]
1300	0.41	.0062	.0005	.2437	.462	24.8		[illegible] .731% [illegible] = 23. [illegible] very similar to interval 0-520 above [illegible] mainly due to differences in methods [illegible]
1400	0.60	.0091	.0004	.7765	1.462	54.6	coarse blebs of pyrite make up approx. 10 vol. % of rock.	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.8		

Chalcopy. Pyrite [illegible] STRUCT. ROCK

PROJECT KELVIN DRILL HOLE NO. J-6 SCALE 1" = 100' PAGE NO. 3 OF 4

LENGTH	Vol.% Fe_3O_4 (comp.)	ASSAYS (%) Cu	Mo	S	Calc. wt.% sulfide	Py/cp	Mineralization & Miscellaneous
1600							trace cuprite (?)
							trace cuprite (?)
	1.60	.0256	.0005	.4756	.915	11.4	18 ppm cobalt magnetite above this zone = 0.48% & below this zone = 0.40 %
1700							
1800							
1900							
2000	0.41	.0047	.0005	.0235	.049	2.6	trace bornite (?) with chalcopyrite
2100							
2200							.0056% zinc (above this zone zinc is extremely variable but averages .0430 %).



Summary Lithology & Alteration Log

[illegible]

Tertiary Cretaceous [illegible] approximately 45% [illegible]

Precambrian Granite [illegible]

[illegible] "alteration" [illegible] Plagioclase [illegible] 4 vol. % [illegible]

[illegible] to [illegible] 5% [illegible]

PROJECT KELVIN DRILL HOLE NO. 1-6 SCALE 1" = 100' PAGE NO. 1 OF 2

LENGTH	% Fe_3O_4 (mag)	ASSAYS (%) Cu	Mo	S	calc. wt % sulfide	Ni/Cp	Mineralization & Miscellaneous
2400	0.38	.0070	.0009	.0557	.111	4.5	Cobalt from 0-2590 feet ranges from a low of 8 ppm to a high of 32 ppm and averages 17 ppm. local highs may be due to diabase or similar rocks. "Background" value ≈ 12 ppm. 22 ppm cobalt (compared to 11 ppm in the interval 1760-2440 feet).
2500							

Chalcopyrite, pyrite, molybdenite, limonite, zeolite, quartz, magnetite, carbonate, feldspar, green mineral, white mineral, STRUCT., ROCK

Cretaceous (?) Intrusive Breccia at 2362½-2421.5½, 2557-2711, 2424-2477, 2501-2562: to subangular (to 1½") of Precambrian Oracle Granite, Quartz, K-feldspar & plagioclase; angular fragments of quartz, K-feldspar, plagioclase, possible fine-grained clay & interstitial K-spar & pyrite. Crystals not fractured. Matrix is generally dark gray to black. Contacts indicate a clear intrusive emplacement for these rocks. Interpreted to be due to fluidization.

Precambrian Oracle Granite.

Precambrian (?) Fine-Grained Diabase: 2711-2801, 2801-2890

date started: 4 APRIL 1977
date completed: 25 MAY 1977
total length : 2590 feet
Hole size:
0-512 : 5⅛ hammer bit
512-518 : 4¾ hammer bit
518-940 : 4¾ tricone (rotary)
940-2590: NQ wireline core
collar location: approximately 250 FWL & 1150 FNL, section 16, T.4 S., R.13 E., Pinal Co., Ariz.
collar elevation: approx. 2450'
inclination : -90° (see note opposite).

Drilling Contractor: LONGYEAR CO.

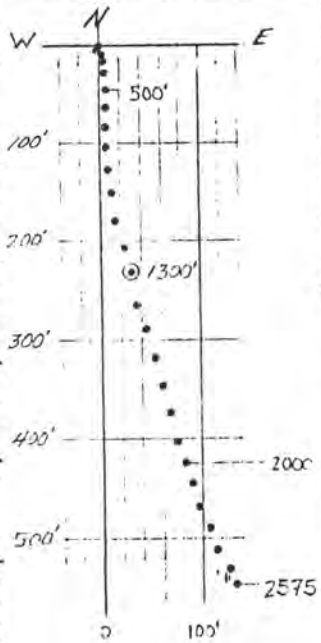
Casing left in hole:
0-21 : 6 inch ID
0-1710 : 3 inch ID.

Hole capped with; scrap steel set on end of casing.

Average footage / shift = 16.8
Direct drilling cost : $ 13.10 /ft
Mud, additives, water : 1.03 /ft
Mobilization .83 /ft
Assaying .88 /ft
Surveying .24 /ft
geolograph rental .23 /ft
Splitting .23 /ft
Thin sections .08 /ft
Casing left in hole & rock bits $1.50 /ft
TOTAL $18.12

LOGGED BY: J.P. VROMAN.

GYROSCOPIC HOLE SURVEY (1" = 200')



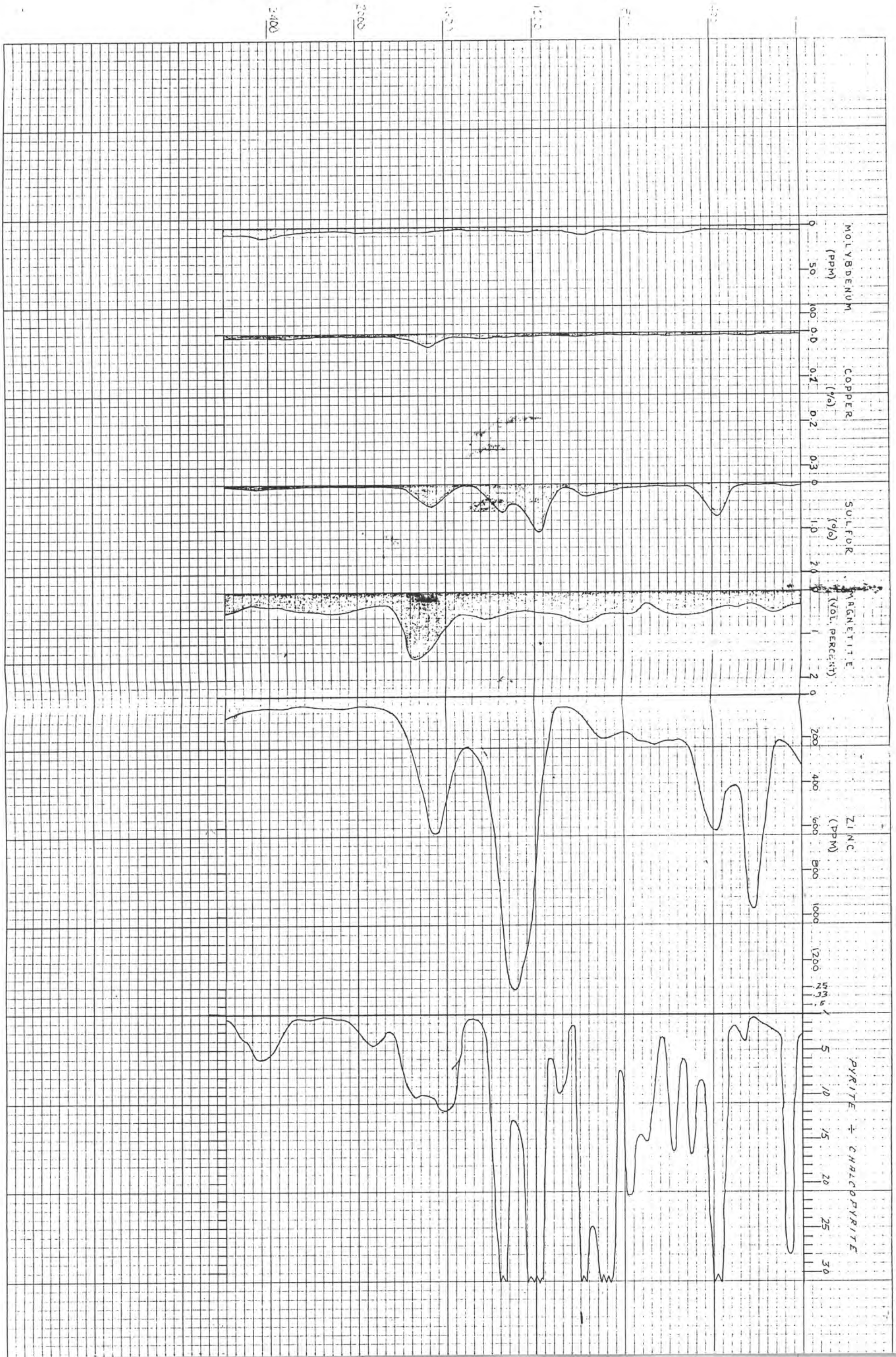
NOTE: The hole was started from surface to 17.9 feet with a rotary rig. A core rig was not on site & due to cracked and broken casing could not get back on bottom. The hole was wedged off (approximately 6' at 940 feet for a seal in the 3 inch casing) and drilling proceeded [illegible] the 3 inch casing, to 2590 feet with NQ wireline tools. Due to the hole problems a directional survey was run in the hole on 5/25/77 - the results of which are plotted to the [illegible] at left.

Rotary (0-1710') [illegible] = 40.7
Core (1710-2590) [illegible] = 24.3
exclusive of mobilization-rigup time & time between [illegible] rotary [illegible] of core [illegible] (940-1710). The latter time was approx. 15 [illegible]

Hole bottom is 5[illegible] feet south [illegible] 138 feet east of the collar. Total length is 2590 feet. Total Depth is 2519 feet.

K·E 10 X 10 TO THE INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

47 0700



AMPAD EFFICIENCY, LINE NO. 6636

C.S.M.C. KELVIN PROJECT - HOLE J

in rotary portion
* average meter reading x 0.75
(factor determined by comparison of core to cuttings 960-1710)

	INTERVAL	ASSAY 1 % Cu	2 wt. % Cp	3 % S in cp.	ASSAY 4 % S	5 % S in py	6 wt % py	7 TOTAL WT SULFIDES	8 Py/CP	ASSAY * 9 % Mo	10 % Fe_3O_4	ASSAY 11 % Zn	12	13 PPM
ROTARY	0-40 1	.0026	.0075	.0026	.0170	.0144	.0269	.034	3.6	.0006	.240	.0336		10
	40-80 2	.0025	.0072	.0025	.1110	.1085	.2030	.210	28.2	.0006	.360	.0247		20
	80-120 3	.0032	.0092	.0032	.0200	.0168	.0314	.041	3.4	.0006	.525	.0145		12
	120-160 4	.0033	.0095	.0033	.0175	.0142	.0266	.036	2.8	.0006	.570	.0138		12
	160-200 5	.0050	.0144	.0050	.0215	.0165	.0309	.045	2.1	.0007	.285	.0517		12
	200-240 6	.0055	.0159	.0056	.0175	.0119	.0222	.038	7.4	.0005	.195	.1974		10
	240-280 7	.0034	.0078	.0034	.0245	.0211	.0395	.049	4.0	.0005	.330	.0229		10
	280-320 8	.0050	.0144	.0050	.0230	.0180	.0337	.048	2.3	.0005	.525	.0156		10
	320-360 9	.0030	.0087	.0030	.0610	.0580	.1085	.117	12.5	.0006	.285	.0299		12
	360-400 10	.0029	.0084	.0029	1.7900	1.7871	3.3435	3.352	398.0	.0005	.315	.0137		14
	400-440 11	.0027	.0078	.0027	.0920	.0893	.1671	.175	21.4	.0004	.525	.0596		10
	440-480 12	.0040	.0116	.0040	.0500	.0460	.0861	.098	7.4	.0006	.570	.0257		10
	480-520 13	.0032	.0092	.0032	.0860	.0828	.1549	.164	16.8	.0006	.435	.0307		12
	520-560 14	.0071	.0205	.0072	.0735	.0663	.1240	.145	6.0	.0010	.585	.0110		22
	560-600 15	.0029	.0084	.0029	.0780	.0751	.1405	.149	16.7	.0010	.615	.0251		14
	600-640 16	.0101	.0292	.0102	.0680	.0578	.1081	.137	3.7	.0008	.420	.0169		16
	640-680 17	.0031	.0090	.0031	.0435	.0404	.0756	.085	8.4	.0006	.240	.0283		12
	680-720 18	.0028	.0081	.0028	.0685	.0657	.1229	.131	15.2	.0005	.480	.0172		12
	720-760 19	.0036	.0104	.0036	.0855	.0819	.1532	.164	14.7	.0006	.405	.0273		12
	760-800 20	.0022	.0064	.0022	.0760	.0738	.1381	.144	21.6	.0005	.585	.0115		12
	800-840 21	.0044	.0127	.0044	.0540	.0496	.0928	.105	7.3	.0005	.525	.0144		12
	840-880 22	.0026	.0075	.0026	.3635	.3609	.6752	.683	90.0	.0004	.405	.0241		16
	880-920 23	.0024	.0069	.0024	.1220	.1196	.2238	.231	32.4	.0004	.420	.0227		12
	920-960 24	.0033	.0095	.0033	.1290	.1257	.2352	.245	24.8	.0005	.750	.0187		10
CORE	960-1000 25	.0044	.0129	.0045	.5210	.5165	.9662	.979	74.9	.0017	.874	.0042		12
	1000-1040 26	.0083	.0240	.0084	.0375	.0291	.0544	.078	2.3	.0006	.486	.0069		10
	1040-1080 27	.0053	.0153	.0053	.0655	.0602	.1126	.128	7.4	.0005	.655	.0067		10
	1080-1120 28	.0050	.0144	.0050	.0810	.0760	.1422	.157	9.9	.0006	.482	.0031		10
	1120-1160 29	.0040	.0116	.0040	.0410	.0370	.0692	.081	6.0	.0004	.478	.0104		10
	1160-1200 30	.0034	.0098	.0034	2.4760	2.4726	4.6260	4.636	472.0	.0006	.533	.0058		10
	1200-1240 31	.0050	.0144	.0050	.4185	.4135	.7736	.788	53.7	.0006	.412	.1890		14
	1240-1280	.0070	.0202	.0071	.1760	.1689	.3160	.336	15.6	.0005	.390	.0649		14
	1280-1320	.0066	.0191	.0067	.1365	.1298	.2428	.262	13.0	.0005	.420	.1681		12

AMPAS EFFICIENCY, LINE NO. 6636

C.S.M.C. KELVIN PROJECT - HOLE J-6

INTERVAL	ASSAY 1 % Cu	2 wt % Cp	3 % S in Cp	ASSAY 4 % S	5 % S in py	6 wt % py	TOTAL WT SULFIDES	8 Py/Cp	ASSAY 9 % Mo	10 % Fe_3O_4	ASSAY 11 % Zn	12		13 PPM C
1320-1360 1	.0111	.0321	.0112	1.2765	1.2653	2.3672	2.399	73.7	.0004	.600	.1448			18
1360-1400 2	.0071	.0205	.0072	.2765	.2693	.5038	.524	24.6	.0004	.598	.0217			12
1400-1440 3	.0112	.0324	.0113	.0990	.0877	.1641	.196	5.1	.0005	.650	.0502			12
1440-1480 4	.0098	.0283	.0099	.0350	.0251	.0470	.075	1.7	.0004	.553	.0237			12
1480-1520 5	.0111	.0321	.0112	.0385	.0273	.0511	.083	1.6	.0004	.607	.0125			12
1520-1560 6	.0049	.0142	.0049	.0490	.0441	.0825	.097	5.8	.0002	.490	.0296			12
1560-1600 7	.0059	.0170	.0060	.0705	.0645	.1207	.138	7.1	.0004	.502	.0378			10
1600-1640 8	.0046	.0133	.0046	.3225	.3179	.5948	.608	44.7	.0004	.984	.0473			16
1640-1680 9	.0672	.1941	.0678	1.0100	.9422	1.7625	1.957	9.1	.0006	1.679	.1113			22
1680-1720 10	.0084	.0243	.0085	.0910	.0825	.1543	.179	6.3	.0007	.726	.0119	4	4	10
1720-1760 11	.0220	.0635	.0222	.4790	.4568	.8546	.918	13.5	.0004	3.014	.0581	430	13	22
1760-1800 12	.0048	.0139	.0048	.0275	.0227	.0425	.056	3.1	.0007	.514	.0038	56	13	10
1800-1840 13	.0064	.0185	.0065	.0300	.0235	.0440	.062	2.4	.0006	.230	.0051			10
1840-1880 14	.0057	.0165	.0058	.0235	.0177	.0331	.016	2.0	.0005	.315	[illegible]			12
1880-1920 15	.0048	.0139	.0048	.0395	.0347	.0649	.079	4.7	.0006	.358	.0068			12
1920-1960 16	.0050	.0144	.0050	.0525	.0475	.0889	.103	6.2	.0007	.311	.0039			12
1960-2000 17	.0034	.0098	.0034	.0190	.0156	.0292	.039	3.0	.0006	.423	.0044			10
2000-2040 18	.0037	.0107	.0037	.0175	.0138	.0258	.037	2.4	.0006	.304	.0054			12
2040-2080 19	.0040	.0116	.0040	.0065	.0025	.0047	.016	.41	.0004	.615	.0051			12
2080-2120 20	.0050	.0144	.0050	.0240	.0190	.0355	.050	2.5	.0004	.403	.0037			12
2120-2160 21	.0037	.0107	.0037	.0090	.0053	.0099	.021	.93	.0004	.518	.0056			12
2160-2200 22	.0055	.0159	.0056	.0050	—	—	.016	—	.0004	.441	.0050			8
2200-2240 23	.0060	.0173	.0061	.0340	.0279	.0522	.069	3.0	.0006	.458	.0043			10
2240-2280 24	.0037	.0107	.0037	.0170	.0133	.0249	.036	2.3	.0006	.435	.0040			8
2280-2320 25	.0030	.0087	.0030	.0295	.0265	.0496	.058	5.7	.0008	.443	.0029			10
2320-2360 26	.0043	.0124	.0043	.0385	.0342	.0640	.076	5.2	.0005	.316	.0030			10
2360-2400 27	.0060	.0173	.0061	.0740	.0679	.1270	.144	7.3	.0008	.287	.0049			12
2400-2440 28	.0096	.0277	.0097	.0710	.0613	.1147	.142	4.1	.0020	.495	.0040			12
2440-2480 29	.0061	.0176	.0062	.1225	.1163	.2176	.235	12.4	.0006	.298	.0051			16
2480-2520 30	.0112	.0324	.0113	.0295	.0182	.0341	.066	1.1	.0008	.250	.0094			30
2520-2560 31	.0042	.0121	.0042	.0615	.0573	.1072	.119	8.9	.0008	.476	.0052	22		12
2560-2590	.0117	.0338	.0118	.0190	.0072	.0135	.047	.40	.0008	.490	.0110			32

CA AMPAD EFFICIENCY, LINE NO. 6636

CSMC KELVIN PROJECT . HOLE J-6

FIVE POINT WEIGHTED RUNNING AVERAGES

0-960 = ROTARY CUTTINGS : 960 – 2590 = CORE

	INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5	wt % py	7 py/cp	8	9	10 vol. % cp (Cu x 1.8363)	11 vol % py (wt. py x .532)	12 vol % Fe_3O_4	13 Mc
	0-40 1	.0026	.0006	.0285	.0487		.0851	11.3			.0048	.0453	.312	5.4
	40-80 2	.0028	.0006	.0235	.0570		.1014	12.5			.0051	.0539	.388	6.7
	80-120 3	.0032	.0006	.0210	.0403		.0694	7.5			.0059	.0369	.458	7.5
	120-160 4	.0038	.0006	.0377	.0262		.0419	3.8			.0070	.0223	.449	7.2
	160-200 5	.0045	.0006	.0715	.0198		.0286	2.2			.0083	.0152	.352	5.6
	200-240 6	.0047	.0006	.0974	.0205		.0296	2.2			.0086	.0157	.302	4.9
	240-280 7	.0043	.0005	.0642	.0251		.0389	3.1			.0079	.0207	.338	5.5
	280-320 8	.0040	.0005	.0412	.1676		.3061	26.5			.0073	.1628	.382	8.3
	320-360 9	.0034	.0005	.0442	.4508		.8370	85.2			.0062	.4453	.369	12.3
	360-400 10	.0031	.0005	.0618	.7294		1.3588	151.7			.0057	.7229	.393	16.8
	400-440 11	.0031	.0005	.0563	.4713		.8760	97.8			.0057	.4660	.462	14.0
	440-480 12	.0037	.0006	.0392	.2037		.3742	35.0			.0068	.1991	.510	10.7
	480-520 13	.0042	.0007	.0268	.0747		.1319	10.9			.0077	.0702	.522	9.0
	520-560 14	.0052	.0009	.0204	.0752		.1308	8.7			.0095	.0696	.543	9.3
	560-600 15	.0056	.0009	.0206	.0726		.1252	7.7			.0103	.0666	.520	9.0
	600-640 16	.0060	.0008	.0210	.0651		.1104	6.4			.0110	.0587	.441	7.7
	640-680 17	.0047	.0007	.0228	.0608		.1050	7.7			.0086	.0559	.378	6.6
	680-720 18	.0036	.0006	.0216	.0612		.1190	11.4			.0066	.0633	.262	5.0
ROTARY	720-760 19	.0031	.0005	.0204	.0737		.1321	14.8			.0057	.0703	.460	8.0
ROTARY	760-800 20	.0031	.0005	.0172	.0947		.1714	19.1			.0057	.0912	.507	9.1
ROTARY	800-840 21	.0033	.0005	.0176	.1382		.2524	26.5			.0061	.1343	.494	9.5
ROTARY	840-880 22	.0030	.0004	.0197	.1962		.3615	41.7			.0055	.1923	.477	10.1
ROTARY	880-920 23	.0030	.0005	.0200	.2048		.3775	43.6			.0055	.2008	.536	11.1
ROTARY	920-960 24	.0037	.0008	.0158	.2288		.4211	39.4			.0068	.2240	.656	13.3
CORE	960-1000 25	.0050	.0010	.0098	.2532		.4643	32.1			.0092	.2470	.704	14.4
CORE	1000-1040 26	.0061	.0008	.0068	.1659		.2990	17.0			.0112	.1591	.635	12.1
CORE	1040-1080 27	.0058	.0006	.0060	.0958		.1684	10.1			.0107	.0896	.581	10.2
CORE	1080-1120 28	.0050	.0005	.0063	.2491		.4567	31.6			.0092	.2430	.530	11.7
CORE	1120-1160 29	.0043	.0005	.0218	.6431		1.1951	96.2			.0079	.6358	.508	17.3
CORE	1160-1200 30	.0043	.0005	.0546	1.0781		2.0090	161.7			.0079	1.0688	.482	23.4
CORE	1200-1240 31	.0051	.0006	.1034	.7866		1.4621	99.3			.0094	.7778	.442	18.4
	1240-1280	.0065	.0005	.1192	.4844		.8939	47.6			.0119	.4756	.429	13.7
	1280-1320	.0076	.0005	.1293	.4412		.8110	36.9			.0140	.4315	.468	13.7

OA AMPAD EFFICIENCY, LINE NO. 6636

5 PT. RUNNING AVE. — HOLE J-6

18363

INTERVAL	1 % Cu	2 % Mo	3 % Zn	4 % S	5	6 wt % py	7 py/cp	8 wt % py	9 py/cp	10 vol % cp	11 vol % py	12 vol % Fe_2O_3	13 MC
1320-1360 1	.0088	.0004	.1083	.6074		1.1198	44.1			.0162	.5957	.546	17.4
1360-1400 2	.0091	.0004	.0650	.4370		.8004	30.5			.0167	.4258	.593	15.5
1400-1440 3	.0099	.0004	.0419	.2110		.3761	13.2			.0182	.2001	.603	12.4
1440-1480 4	.0098	.0004	.0275	.0702		.1128	4.0			.0180	.0600	.586	10.0
1480-1520 5	.0090	.0004	.0239	.0472		.0713	2.7			.0165	.0379	.563	9.3
1520-1560 6	.0068	.0003	.0285	.0715		.1209	6.2			.0125	.0643	.563	9.6
1560-1600 7	.0105	.0004	.0418	.1935		.3422	11.3			.0193	.1821	.709	13.7
1600-1640 8	.0196	.0005	.0558	.3842		.6818	12.0			.0360	.3627	.975	20.6
1640-1680 9	.0310	.0005	.0639	.5262		.9259	10.3			.0569	.4926	1.311	27.9
1680-1720 10	.0245	.0006	.0478	.4055		.7124	10.1			.0450	.3790	1.477	28.5
1720-1760 11	.0172	.0006	.0352	.2916		.5131	10.3			.0316	.2730	1.592	28.4
1760-1800 12	.0095	.0006	.0178	.1368		.2380	8.7			.0174	.1266	1.026	17.6
1800-1840 13	.0069	.0006	.0099	.0632		.1052	5.3			.0126	.0560	.539	9.1
1840-1880 14	.0055	.0006	.0068	.0312		.0480	3.0			.0101	.0255	.320	5.3
1880-1920 15	.0051	.0006	.0063	.0365		.0587	4.0			.0094	.0312	.332	5.6
1920-1960 16	.0045	.0006	.0052	.0368		.0604	4.6			.0083	.0321	.347	5.8
1960-2000 17	.0040	.0006	.0048	.0270		.0430	3.7			.0073	.0229	.379	6.1
2000-2040 18	.0039	.0005	.0050	.0185		.0273	2.4			.0072	.0145	.411	6.5
2040-2080 19	.0041	.0005	.0053	.0142		.0189	1.6			.0075	.0101	.472	7.3
2080-2120 20	.0044	.0004	.0055	.0145		.0189	1.5			.0081	.0101	.474	7.4
2120-2160 21	.0046	.0004	.0053	.0133		.0163	1.2			.0084	.0087	.477	7.4
2160-2200 22	.0050	.0005	.0050	.0150		.0187	1.3			.0092	.0099	.459	7.2
2200-2240 23	.0060	.0005	.0044	.0211		.0283	1.6			.0110	.0151	.452	7.2
2240-2280 24	.0076	.0006	.0042	.0245		.0316	1.4			.0140	.0168	.433	7.0
2280-2320 25	.0094	.0007	.0046	.0325		.0432	1.6			.0173	.0230	.401	6.6
2320-2360 26	.0081	.0008	.0055	.0455		.0670	3.0			.0149	.0356	.362	6.2
2360-2400 27	.0073	.0010	.0053	.0654		.1085	5.1			.0134	.0577	.355	6.4
2400-2440 28	.0077	.0012	.0052	.0779		.1312	5.9			.0141	.0698	.369	6.8
2440-2480 29	.0079	.0010	.0058	.0807		.1360	6.0			.0145	.0724	.345	6.5
2480-2520 30	.0083	.0008	.0071	.0607		.0979	4.1			.0152	.0521	.351	6.3
2520-2560 31	.0080	.0008	.0077	.0480		.0747	3.2			.0147	.0397	.408	6.7
2560-2590	.0091	.0008	.0089	.0343		.0470	1.8			.0167	.0250	.459	7.5

77% / 1 Kspar / 1 CO3 / 1 epi

AMPAD EFFICIENCY LINE NO. 6636

1950 – 1960 { 62% sericite, 10% clay, 2 chlorite

do alt. of I Bx

quartz – ✓ [illegible]

DEPTH	ROCK	PLAGIOCLASE 1	clay	chl	CO_3	epi	K-spar 3	K-SPAR 7	ser.	clay	chl.	CO_3	epi	K-spar	qtz	mrg	7	MAFICS	ser	chl	mag	CO_3	clay	epi	qtz	Biot	COMMENTS cat. 11 qtz	12	13	JAH
1155	Yr 1	100		some					some		min									60				40						
1171	↑ 2	80		min	✓															80	10									
1191	3	70			5														?	60	20		20							
1211	4	90	?																20	50	20									
1243	5	some	95																	50				10						
1257	6	99							5		5								10	60	20									
1298	7		70									cem.	some		some					70				20						
1142	8	80	8	Tr	12							10							15	70	5									X
1158	9	28	15?											some						11										X
1194	10	95		Tr					10		5									100										X
1207	11	95		4							10									100										X
1223	12	15?	80	2	5						5	20								80			20							X
1264	13	30											3						30	90		10		10						
1327	14	60 →			5														10	70		10								
1345	15	70	20	10					50	15	30	2			2				←	100						Texture destructive etc.				X
1406	16	100			min														10	70	10									
1409	17	40				min			min										10	60	5	5		10						
1452	18	65 →																		100		min								
1495	19	18	?			5							Tr							70				30						X
1508	20	10	40																					40						X
1541	21																									epidote added				X
1608	↓ 22	25	?																	12				18						X
1628	Yr 23	90		10	10				70		10	10																		X
1642	Yr Bx 24	90							40		30				25					80	15									X
1657	II 25	90		10															20	70										X
1708	Yr 26	70		10			20																							X
1734	↑ 27	95							5		20	Tr			5					80	20									X
1783	28	20									4	Tr			2					60	40									X
1827	29	45				min					2									6										X
1855	30	12			4							5							30	10		10	5							X
1912	31	40		15															20	40		10	?							X
1928		0																												X
1940		30		30																60				30						X
1981		18		25																40				15						X
2044	1	15		Tr									2	2						30				60	10	50		Bio [illegible]		X
2062	2	2											4								20									X
2082	3	5	20																	5						50				X
2102	4	5	5																	20			50	5						X
2138	5	10				5														70	5			20						
2143	6	20				2							2							65	10			15						
2223	7	20				1	1				5		10						10	30				10						
2259	↓ 8		40																	20 →										
2340	Yr 9	10				1							✓							100										
2391	I Bx 10																													
2400	11																													
2405	↓ 12																													
2463	I Bx 13																			25										
2500	db/pot 14			5																18				✓						
2512	db/pot 15			Tr																100 →										
2534	Yr 16	10									5		5																	
2565	db 17																			25										
2584	db 18		10																											
Yr 1783-2584	19	15	+	4	Tr	Tr	Tr		0	0	Tr	Tr	1		Tr	Tr														

	1	2	3	4	5	6	7	8	9	10	11	12	13
Thallium[1]	all	results	< 10	ppm									
Tellurium[2]	high	population	in	J2	1300-1700	(>100 ppm)		(remaining	values,	except 1,	< 30 ppm)		
Indium 3	high	population	in	J3	160-560 }	4 values	(mean) =	34.5	(median	of remaining	= 12 ppm)		
4				J6	480-640 }								
Tin 5	low	population	in	J4	1720-3104	(mean = 11.3 ppm)		(median	of remainder	= 22.5 ±)			
Iron 6	low	population	in	J6	1840-2590								
7	high	"	in	J1									
8				J2									
9				J4									
10				J5: 1640-2520									
Lead 11	high	population	related to	faults	(J2: 1300-1400, 2680-2760 & J5: 1480-1560)								
12			and in	KM-6	19'-500								
13				J2	200-300		may describe zone						
14				J3	160-560								
15				J4	600-920								
16	high	population	in	KM-[illegible]									
17				J1	500-2473								
18	low	population	in	J4	1320-[illegible]								
19				J5	2120-2825								
20	low	population	in	J6	0-1200								
21	high	population	in	J1	1900-2400	(500')							
22				J4	2360-3000	(640')							
23				J5	1800-2600	(800')							
24	lowest	population	in	J6									
25	low	"	in	J3:	16-1680, 2880-2960								
26				J4:	600-1960, 3000-3104								
27	high	population	"	J5:	2120-2825								
Silver 28	high	population	~scattered & possibly related to post mineral faults										
29	low	population	in	J6									
Tungsten 30	low	population	in	J4:	1640-1880	}	may be more subtle						
31					2920-3104	}	differences - possible recheck						
	high	pop (possible)		J1	1200-1600	}	(see J5 for example)						
				J6:	480-720	}							

AMPAD EFFICIENCY LINE NO. 6636

cobalt	high	population in		J4:	2040-	3000							
				J5:	1640-	2440							
	low	population in		KM-6									
				J6:	80-1200 & 1840-2590								
Arsenic	less	than 6% of samples "anomalously high" — these values are mostly scattered											
		possible high in		J3:	2080-2800								
Nickle	high	population in		J4	1640-	2600							
				J5	1640-	2600							
	low	population in		KM-6									
				J3									
				J5:	1440-	1640							
				J6:	1840-	2590							
ZINC	high	population in		J2:	1300-	1400	fault ?						
				J3:	160-	2960							
				J4:	3000-	3104	fault ?						
				J5:	1440-	1560	fault ?						
				J6:	1200-	1840							
	low	population (?) in		J1:	1200-	1700	— upper block (move S w.r.t. J2-J4 ?)						
				J2:	1500-	2200	middle block						
				J4:	1720-	2680							
BISMUTH	high	population in:		fault related zones									
	"	"	"	middle block									
	"	"	"	lower part of upper block hole J1 & J3 ??									

KM-6

	1 ~~3~~ 2	1 ~~Fe3O4~~	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe	7 Cu	8 Zn	9 Pb	10 Sn	Bi	11 WO4	12 As	In	13 Te	Tl
	✓	✓	✓	✓	✓	✓	✓	%	%	✓	✓	✓	✓	✓	✓	✓	✓	✓
19-100	.17	.10	90	4	15	30	21,200	16.5	.2690	690	310	50	17	68	-20	4	-10	-10
100-200	.13	.22	60	5	40	40	35,500	22.0	.0500	1900	460				-100			
400-500	.18	.06	30	4	-15	30	105,000	20.7	.1430	1465	1585	>100	12	86	-20	4	-10	-10

J1-J6, KM6:

All Tl assays < 10 ppm

J1

	1 >3.3 (wt %)	2 Fe_3O_4 (wt %)	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe (%)	7 Cu (%)	8 Zn	9 Pb	10 Sn	Bi	11 WO4	12 As	In	13 Te	Tl
15-100 1	1.4	1.7	270	18	30	320	24,000	15.1	2.58	3800	180	76	11	>200	-50	5	-10	-1
100-200 2	.98	.52	340	18	50	700	4050	28.5	2.90	775	260	26	11	160	-50	5	-10	
200-300 3	.65	1.0	820	12	70	990	10,400	29.5	2.25	3225	410	35	10	140	-50	10	-10	
300-400 4	.49	1.1	2920	18	60	740	12,200	27.6	2.25	1150	740	58	10	140	-50	14	-10	
400-500 5	.99	.83	820	35	100	730	3625	28.5	4.99	2600	320	20	10	110	-50	10	-10	
500-600 6	.54	.81	860	38	60	440	10,300	24.6	7.32	1125	190	35	13	70	-50	7	-10	
600-700 7	.42	1.2	990	6	69	505	24,400	25.0	1.93	57	80	49	6	64	-50	13	-10	
700-800 8	.61	.81	190	15	50	520	13,500	25.9	2.38	7750	540	68	13	130	-50	9	-10	
800-900 9	.39	.89	120	8	60	620	17,200	26.0	1.45	50	120	65	13	110	-50	10	-10	
900-1000 10	.49	.62	350	15	80	300	12,600	24.1	3.89	2225	220	64	13	120	-50	10	-10	
1000-1100 11	.39	.36	60	20	80	340	11,800	27.5	1.95	725	200	66	12	130	-50	8	-10	
1100-1200 12	.39	.21	650	18	110	550	15,000	31.9	4.85	4925	190	48	17	120	-50	6	-10	
1200-1300 13	.48	.31	170	10	90	240	21,000	25.4	2.18	50	100	72	32	>200	-50	8	-10	
1300-1400 14	1.3	.14	270	12	80	420	6750	33.5	1.80	75	100	52	70	>200	-50	7	27	
1400-1500 15	.37	.49	145	8	49	180	25,300	25.5	1.71	82	93				-70			
1500-1600 16	.36	.50	255	7	57	245	26,400	25.4	1.89	71	171	>100	15	>200	-70	7	-10	
1600-1700 17	.23	.20	860	15	77	585	15,400	29.4	5.42	38	154	86	14	>200	-80	6	-10	
1700-1800 18	.34	.13	1235	18	58	420	8720	24.7	4.34	145	131				-80			
1800-1900 19	.34	.26	305	11	43	195	8135	29.3	1.22	813	195				-100			
1900-2000 20	.31	.26	200	29	83	200	13,700	26.2	10.8	374	150				-80			
2000-2100 21	1.1	.41	190	78	60	290	4750	31.9	6.65	5700	200	35	52	80	-50	8	-10	
22																		
2200-2300 23	.20	.65	465	28	56	170	32,300	26.0	4.14	316	197				105			
2300-2400 24	.47	.87	1030	29	71	430	15,700	30.2	7.39	286	114	39	13	160	-80	6	-10	
2400-2478 25	.95	.35	780	20	50	140	20,000	36.5	1.25	600	120	34	30	120	-50	7	-10	
26																		
27																		
28																		
29																		
30																		
31																		

	Vol % >3.3	Vol % Fe_3O_4	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe %	7 Cu %	8 Zn	9 Pb	Sn	Bi	11 WO4	As	In	Te	T
[illegible]-100 1	.93	.60	20	8	.60	50	20,500	14.0	.1625	450	160				-50			
2																		
[illegible]-300 3	1.7	.37	110	92	.50	170	36,500	31.5	.4750	1025	1200	9	>100	32	375	6	-10	-
300-400 4	.73	1.3	70	10	60	240	30,200	20.8	.0625	425	220	50	17	18	75	4	-10	-
5																		
[illegible]-1200 6	.60	.24	60	108	60	270	8750	23.2	4.45	77,000	5225	11	>100	70	50	10	92	-
1400-1500 7	.46	.68	1550	18	70	250	19,000	20.5	3.36	200	210	54	>100	80	-50	8	86	-
[illegible]-1600 8	.56	.73	810	30	60	390	6500	29.5	6.52	75	180	22	>100	40	-50	8	>200	-
[illegible]-1700 9	.97	.92	930	15	60	220	4250	30.4	1.08	50	80	30	45	90	-50	7	35	-
[illegible]-1800 10	.36	.31	275	7	55	385	4125	35.6	.7220	205	82				-80			
1800-1900 11	.71	.55	185	14	100	400	5355	32.5	3.04	35	43	20	13	54	-80	5	16	-
1900-2000 12	1.0	.68	360	22	120	430	4250	30.6	5.70	550	240	>100	8	50	-50	6	-10	-
13																		
2018-2040 14	.16	.20	105	13	70	395	2155	24.8	2.16	260	138				-100			
2040-2120 15	.21	.28	120	12	60	550	2380	30.6	1.59	89	131				-70			
2120-2200 16	.20	.41	1130	9	85	690	2830	28.9	.7390	63	113				-70			
2200-2280 17	.13	.30	185	16	85	705	5185	29.0	2.02	210	104				-100			
[illegible]-2360 18	.09	.24	215	15	60	375	7410	24.2	2.47	148	474				-100			
2360-2440 19	.14	.29	590	14	60	350	3675	30.6	.8040	505	165				-100			
2440-2520 20	.10	.30	155	9	70	280	7855	24.0	.2290	130	122				-100			
2520-2600 21	.10	.25	135	8	35	235	11,700	26.8	.5850	500	435				-100			
[illegible]-2680 22	.06	.14	280	8	-30	215	9260	23.9	.2315	310	278				-150			
2680-2760 23	.37	.22	55	936	70	270	2145	31.6	.8750	605	1714	34	100	130	-80	5	>200	-
2760-2840 24	.38	.30	45	14	85	345	1430	33.4	.4285	715	186	9	19	50	-80	4	20	-
2840-2920 25	.27	.32	55	14	45	315	6070	31.1	.2140	70	71	15	9	43	-80	5	-10	-
2920-3014 26	.50	1.3	70	5	60	220	6000	31.2	.1250	500	80	15	5	72	-50	4	12	-
27																		
28																		
0-1400 29			65	54						19,725	1701							
1400-2680 30			468	14						222	186							
2680-3014 31			56							472	513							

J3

								%	%									
	wt% Z_3	wt% Fe_3O_4	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe	7 Cu	8 Zn	9 Pb	10 Sb	Bi	11 WO4	12 As	In	13 Te	7
16-80 1	.29	.48	45	7	30	45	16,400	11.8	.0180	605	215	33	13	33	-80	8	-10	-
80-160 2	.27	.47	230	4	55	615	7145	29.5	.0895	430	70	25	19	68	-80	8	-10	-
160-240 3	.23	.53	60	146	30	275	14,200	16.9	1.0800	100,000	4045	31	>100	64	75	29	-10	-
4																		
400-480 5	.17	.18	20	13	60	540	5335	25.0	.2795	36,100	385				-50			
480-560 6	.17	.30	170	54	30	290	19,600	15.2	1.2300	146,000	1370	24	68	30	-50	37	-10	-
7																		
800-880 8	.22	.56	15	8	15	200	18,800	17.9	.0625	15,800	215	38	15	43	-80	11	-10	-1
9																		
1120-1200 10	.20	.45	30	7	30	170	23,200	17.9	.0715	4070	245	35	19	43	-80	10	-10	-1
11																		
1280-1360 12	.08	.10	20	22	-20	170	2690	18.3	.4030	12,600	280				-100			
13																		
1440-1520 14	.17	.35	20	30	100	480	4000	25.5	.6750	32,600	200	15	54	54	-100	12	-10	-1
1520-1600 15	.14	.31	-10	24	35	110	5500	13.4	.3360	74,900	305				-70			
1600-1680 16	.13	.45	15	10	-15	95	16,600	12.0	.0665	16,300	225				-80			
→ 17																		
2080-2160 18	.08	.25	100	8	15	100	8960	13.0	.0610	4225	260				[illegible]			
2160-2240 19	.12	.22	140	14	15	115	1775	17.0	.3545	25,400	240				140			
2240-2320 20	.49	.39	-10	15	80	670	5000	31.0	.3500	13,300	130	10	28	56	75	7	-10	-1
2320-2400 21	.36	.32	100	43	45	370	3570	28.6	.6430	6565	200	10	56	160	105	19	12	-1
2400-2480 22	.20	.58	400	7	15	130	29,300	15.7	.1250	4465	170	47	10	30	-80	10	-10	-1
23																		
2720-2800 24	.31	.38	190	30	40	340	8500	28.5	.8125	37,800	260	15	62	86	150	17	-10	-1
2800-2880 25	.21	.25	100	21	15	185	2500	22.1	.8330	13,200	265	13	34	200	-80	10	-10	-1
2880-2960 26	.20	.49	15	17	35	315	5835	21.2	.1460	4085	315	22	38	170	-80	7	-10	-1
27																		
28																		
16-1680 29	.19		58				12,134							48	80			
1680-2960 30	.25		132				8180							117	114			
31																		
										17.6x	[illegible]							

AMPAD EFFICIENCY LINE NO. 6636

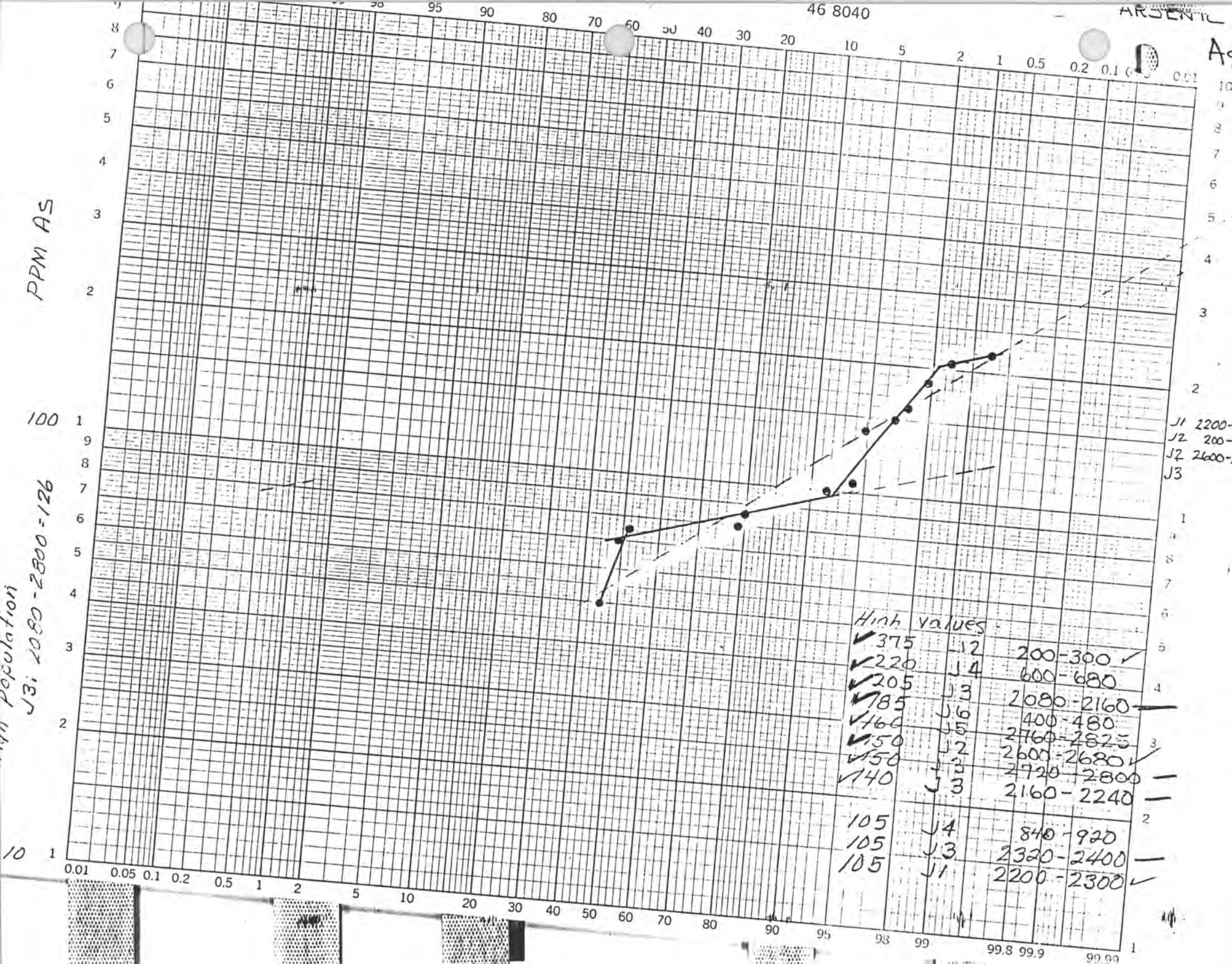
	1 % $3.3	1 % Fe2O3	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe %	7 Cu %	8 Zn	9 Pb	10 Sn	Bi	11 WO4	12 As	In	13 Fe	Tl
600-690 1	.06	.09	45	33	45	305	6520	28.3	1.14	2065	1650				-220			
690-760 2	.09	.08	20	5	35	220	5515	21.8	.1610	690	90				-100			
760-840 3	.19	.17	80	10	110	290	3090	32.6	1.20	995	520				-80			
840-920 4	.40	.40	-15	18	70	455	1785	31.4	.6610	320	470	37	12	120	105	6	-10	-10
920-1000 5	.43	.52	-15	7	130	1255	1785	35.4	.1965	678	70	9	.29	39	-80	5	22	-1
1000-1080 6	.25	.31	10	8	105	555	3210	29.7	.2275	215	140				-50			
1080-1160 7	.17	.55	-20	5	60	380	5000	25.5	.4750	50	200	13	3	42	-100	5	-10	-1
1160-1240 8	.11	.24	-15	8	50	450	8440	23.3	.3820	320	690				-80			
9																		
1420-1540 10	.37	.66	10	8	50	120	1350	21.5	.4875	225	140	45	7	50	-50	8	-10	-1
1540-1640 11	.27	.27	-20	15	60	320	2500	33.8	.9500	2450	380	10	14	76	-100	9	-10	-1
1640-1720 12	.30	.73	15	14	170	570	2140	28.6	.8310	500	145	>100	7	13	-80	6	-10	-
1720-1800 13	.55	2.1	-10	10	410	770	3000	31.4	.6375	50	100	8	7	10	-50	4	-10	
1800-1880 14	.80	.84	30	10	120	280	500	35.0	.4625	75	130	7	28	13	-50	5	10	-
1880-1960 15	1.4	.52	40	10	70	470	1000	39.4	.6250	200	90	7	23	39	-50	5	-10	-
1960-2040 16	.82	.25	190	5	60	580	250	32.9	.3125	650	160	8	28	43	-50	4	-10	-
2040-2120 17	2.6	1.2	280	10	80	1110	315	38.2	1.35	75	130	13	13	60	-50	4	10	-
2120-2200 18	.86	.25	570	12	60	890	515	33.1	.9875	5325	470	17	9	60	-50	4	-10	-
2200-2280 19	.74	.19	790	12	150	1810	300	35.6	.5625	175	130	12	32	76	-50	4	22	-
2280-2360 20	.36	.67	370	11	285	1200	2500	32.7	1.00	215	80	5	30	15	-80	4	14	-
2360-2440 21	.46	.72	1130	11	185	1270	1785	28.9	3.55	70	100	14	9	33	-80	10	-10	-
2440-2520 22	.38	.34	2560	18	170	1115	735	30.9	7.18	70	100	15	10	39	-80	6	-10	-
2520-2600 23	.28	.38	1340	10	120	1180	1160	27.0	5.15	50	80	13	9	39	-100	4	-10	-
2600-2680 24	.38	.22	1380	20	80	920	2250	27.0	4.98	25	40	22	8	60	-50	4	-10	-
2680-2760 25	.90	.28	600	10	60	1020	1000	33.0	2.65	475	70	16	8	96	-50	10	-10	-
2760-2840 26	.79	.41	790	12	80	930	335	33.1	3.19	275	180	12	19	62	-50	4	-10	-
2840-2920 27	.39	.52	600	11	70	960	210	32.5	3.71	855	355	7	30	25	70	4	-10	-
2920-3000 28	.73	.30	310	12	60	840	162	34.8	3.20	2000	200	7	>100	13	-50	5	-10	-
3000-3104 29	.17	.39	120	10	70	580	1250	35.5	.4125	6025	160	8	7	11	50	7	-10	-
30																		
31																		

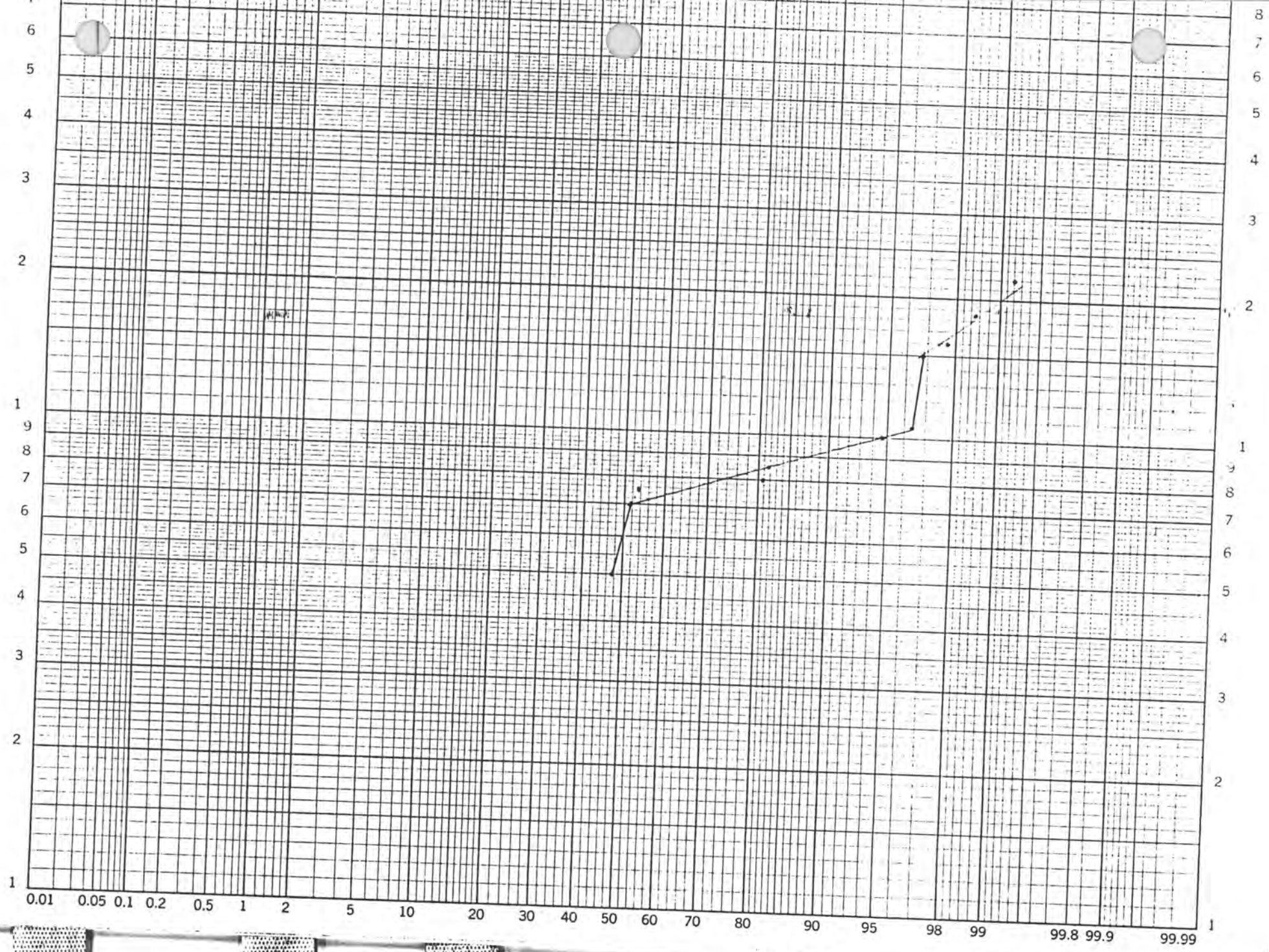
AMPAD EFFICIENCY LINE NO. 6636

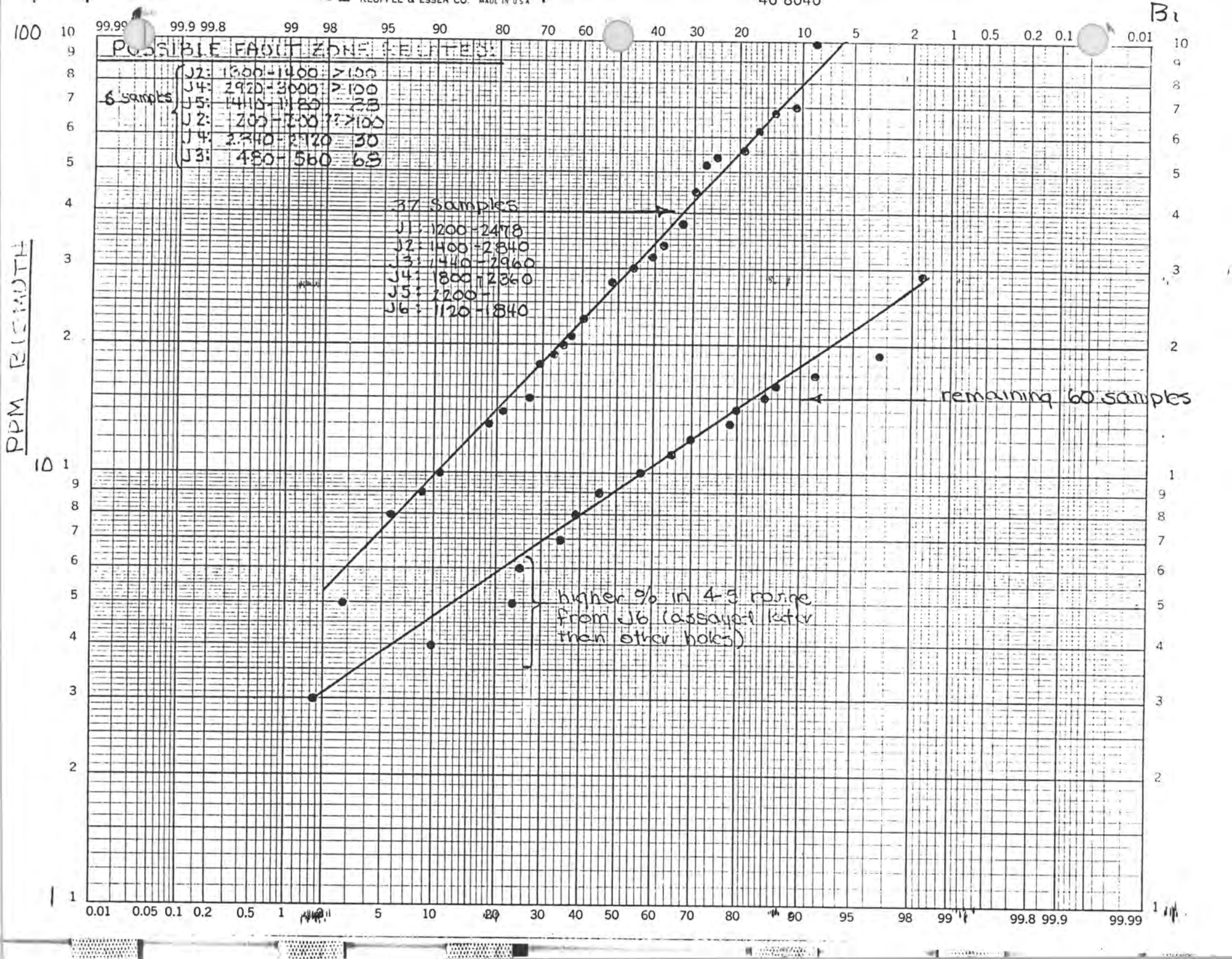
HOLE J-5 - ppm } unless [illegible]

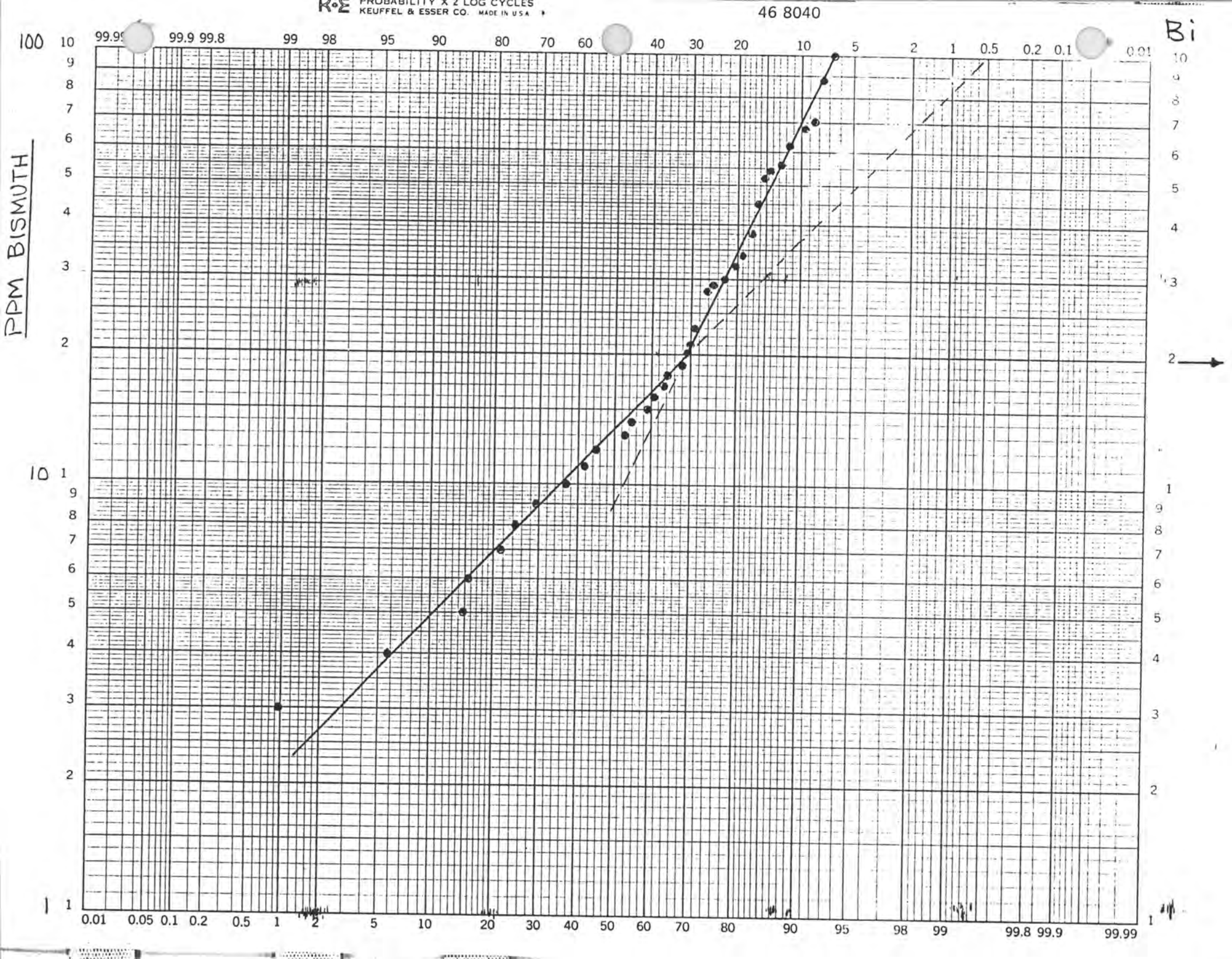
	wt % >3.3	wt % Fe_3O_4	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe %	7 Cu %	8 Zn	9 Pb	10 Sn spectro	Bi spectro	11 WO4 spectro	12 As color	In spectro	Te spectro
1440-1480 1	.27	.27	110	12	30	180	4500	22.8	1.15	11,000	240	52	83	> 200	-50	8	-10
1480-1560 2	.20	.60	515	11	45	230	7140	21.1	.82	5,500	630	>100	15	> 200	-80	7	-10
1560-1640 3	.32	.61	455	7	15	185	5715	20.4	.98	180	185	71	7	160	-80	10	-10
1640-1720 4	.26	1.4	570	18	100	770	1070	27.9	3.93	355	215	18	11	150	-80	6	-10
1720-1800 5	.37	1.2	390	15	70	6201	1750	29.4	1.94	1275	120	25	15	86	-50	7	-10
1800-1880 6	.36	2.7	370	11	25[illegible]	940	6070	26.4	4.04	145	55	21	4	50	-80	7	-10
1880-1960 7	.41	2.8	415	18	315	1185	5000	28.9	6.12	355	30	20	11	160	-80	7	-10
1960-2040 8	.54	2.0	620	20	240	1490	3000	29.8	6.55	2850	50	20	7	39	-50	6	-10
2040-2120 9	.67	3.8	390	15	360	1130	7500	27.0	6.20	100	80	16	4	23	-50	7	-10
2120-2200 10	.33	1.4	2060	19	110	890	825	32.7	5.69	80	30	10	10	15	-80	5	-10
2200-2280 11	.11	.74	2250	12	70	855	1220	31.1	4.26	355	45	7	38	20	-100	5	-10
2280-2360 12	.20	.80	4800	28	150	835	1060	28.9	5.41	155	100	18	>100	90	-70	6	15
2360-2440 13	.45	1.5	1955	25	370	1070	246	36.2	5.04	465	70				-20		
2440-2520 14	.20	.79	1615	42	185	465	1595	29.6	5.33	415	250				-80		
15																	
2600-2630 16	.09	.49	3550	40	80	460	495	24.5	12.0	1400	140				-100		
2630-2760 17	.06	.39	4810	32	45	425	535	19.2	11.5	2940	150				-100		
2760-2825 18	.04	.33	2820	24	65	445	411	16.6	6.9	235	125				-160		
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
										1636	148						

	wt % >3.3	wt % Fe_3O_4	2 Mo	3 Ag	Ni	4 Co	5 Mn	6 Fe %	7 Cu %	8 Zn	9 Pb	10 Sn	Bi	11 WO4	12 As	In	13 Te
0-80 1	.60	.70	10	-3	60	430	10,100	34.0	.0110	2300	170	27	4	80	-50	11	-10
2																	
320-400 3	.33	.15	-20	-5	50	30	4040	32.2	.0071	2460	260	56	10	60	-85	10	
400-480 4	.12	.25	-40	-10	110	-40	17,800	27.4	.0629	4120	150	78	5	110	-185	8	
480-560 5	.37	.43	10	-3	50	50	16,200	26.2	.0200	1850	160	60	4	> 200	-50	27	
560-640 6	.74	.84	10	-3	40	70	24,000	25.0	.0190	2300	110	35	5	> 200	-50	45	
640-720 7	.70	.78	20	-3	40	70	27,200	19.8	.0525	3800	120	25	5	> 200	-50	6	
720-800 8	.82	.90	10	-3	50	100	22,500	22.8	.0355	1950	80	27	5	150	-50	10	
800-880 9	1.30	.83	20	-3	60	210	15,800	26.5	.0145	1200	100	33	10	72	-50	8	
880-960 10	1.33	.83	-10	-3	50	70	10,600	21.0	.0102	1220	100	27	5	72	-50	12	
960-1040 11	.69	.96	40	-3	70	90	1920	24.0	.0488	300	170	14	5	160	-50	8	
1040-1120 12	.56	.71	-10	-3	60	90	11,800	13.2	.1015	200	110	28	4	60	-50	11	
1120-1200 13	1.36	.97	-10	-3	40	50	4100	30.2	.0190	600	80	17	21	60	-50	16	
1200-1280 14	.46	.63	10	-3	50	140	5300	21.5	.1180	19,800	280	21	18	120	-50	16	
1280-1360 15	1.03	.80	-10	-3	50	210	1880	27.2	.1900	35,500	120	10	56	76	-50	21	
1360-1440 16	.22	.62	10	-3	50	210	4000	17.8	.0710	11,500	260	34	5	170	-50	16	
17																	
1520-1600 18	.34	.72	10	-3	60	160	18,200	15.8	.1540	15,500	160	46	15	86	-50	14	
1600-1680 19	.98	1.31	20	12	70	470	2580	30.2	.6280	19,000	220	13	20	140	50	12	
1680-1760 20	.74	1.94	-10	-3	60	260	2850	22.0	.4650	9000	290	19	68	>200	-50	15	
21																	
1880-1960 22	.45	.70	-10	-3	50	40	14,000	8.88	.0570	475	360	35	16	86	-50	10	
23																	
2320-2400 24	.89	.80	-10	-3	30	60	11,900	7.38	.0365	700	120	31	5	38	-50	12	
2400-2480 25	.93	.79	90	-3	60	110	13,000	11.60	.0748	212	120	38	11	32	-50	10	
2480-2590 26	.47	.79	20	-3	8	80	7750	8.25	.0652	550	120	25	9	28	-50	9	
27																	
28																	
80-1760 29			15.6		57	153		24.27		7367				123		15	
1760-2590 30			32.5		37	72		9.03		484				46		10	
31																	


46 8040
ARSENIC
PPM AS
High population
J3: 2080-2800=126
J1 2200-
J2 200-
J2 2600-
J3
High values
375 J2 200-300
220 J4 600-680
205 J3 2080-2160
185 J6 400-480
160 J5 2760-2825
150 J2 2600-2680
150 J3 2720-2800
140 J3 2160-2240
105 J4 840-920
105 J3 2320-2400
105 J1 2200-2300

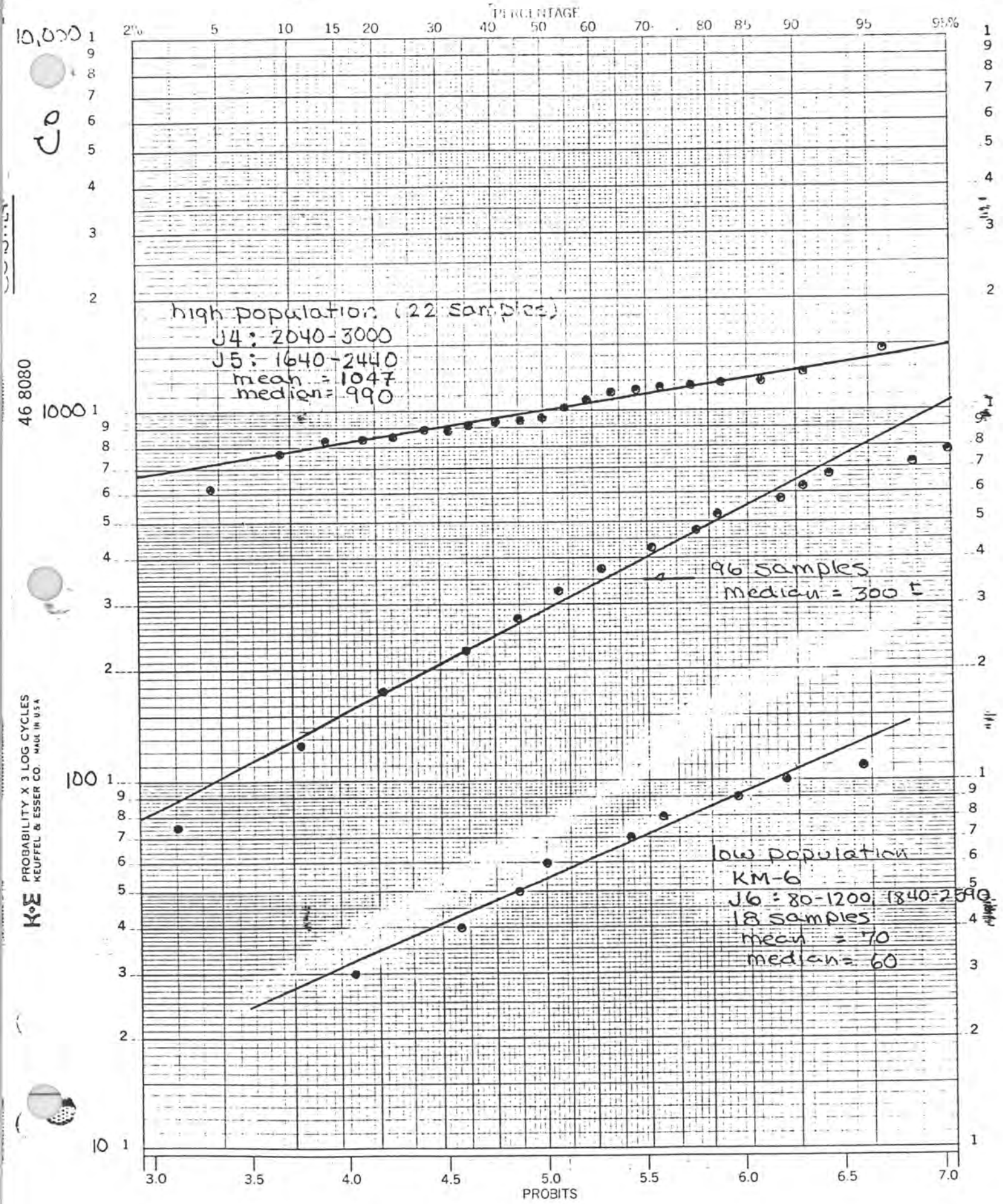

0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99


POSSIBLE FAULT ZONE FEATURES:
6 samples
J2: 1300-1400 >150
J4: 2920-3000 >100
J5: 1410-1480 23
J2: 200-300 ?? >100
J4: 2340-2920 30
J3: 480-560 65
37 samples
J1: 1200-2478
J2: 1400-2840
J3: 1440-2960
J4: 1800-2360
J5: 2200-
J6: 1120-1840
remaining 60 samples
higher % in 4-5 range from J6 (assayed later than other holes)
PPM BISMUTH
100
10
1
99.99 99.9 99.8 99 98 95 90 80 70 60 40 30 20 10 5 2 1 0.5 0.2 0.1 0.01
0.01 0.05 0.1 0.2 0.5 1 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99

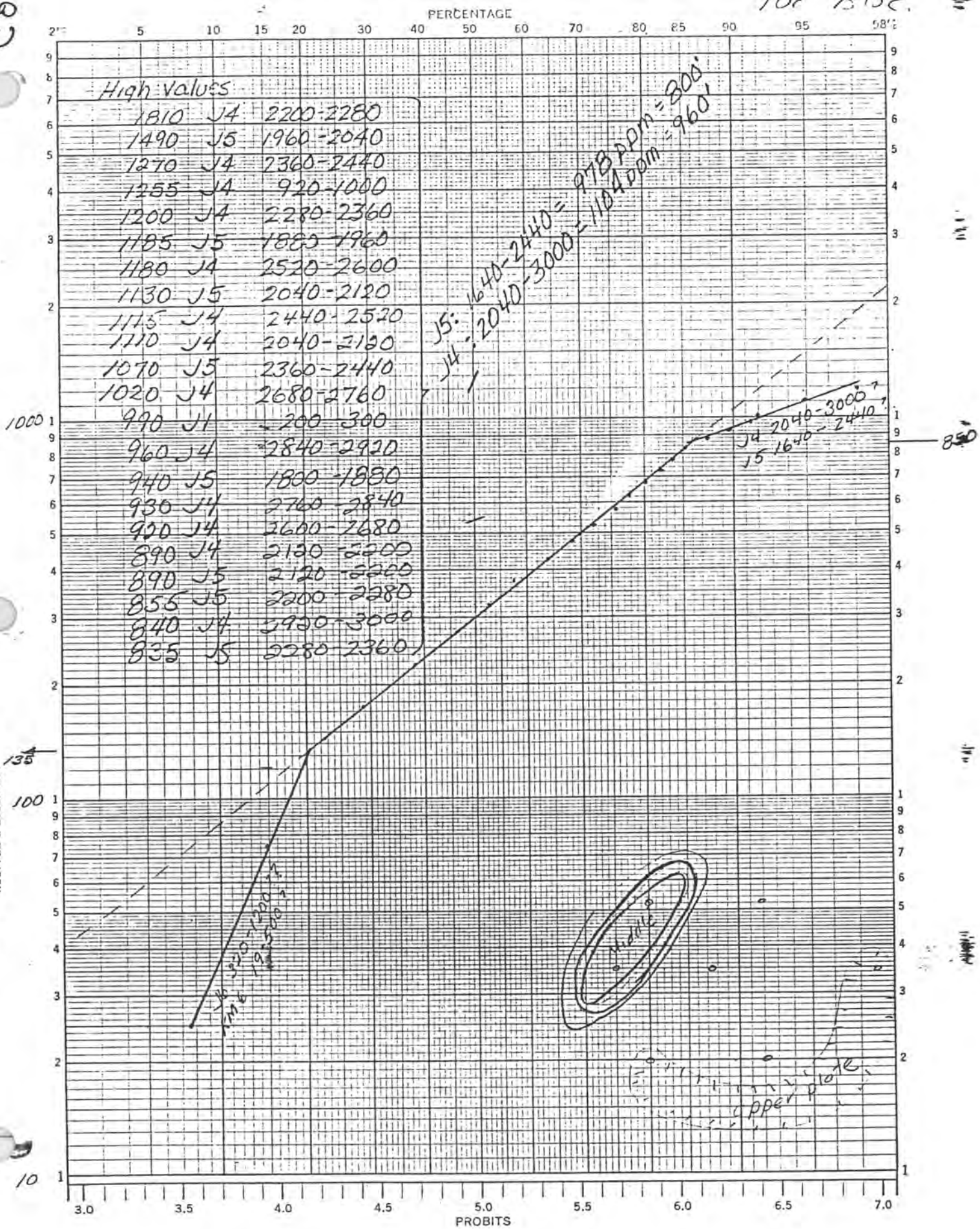


K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
PPM BISMUTH
Bi
100
10
1
99.99 99.9 99.8 99 98 95 90 80 70 60 40 30 20 10 5 2 1 0.5 0.2 0.1 0.01
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99

COBALT


PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
10,000
1000
100
10
Co
high population (22 samples)
J4: 2040-3000
J5: 1640-2440
mean = 1047
median = 990
96 samples
median = 300
low population
KM-6
J6: 80-1200, 1840-2590
18 samples
mean = 70
median = 60
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBITS
46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

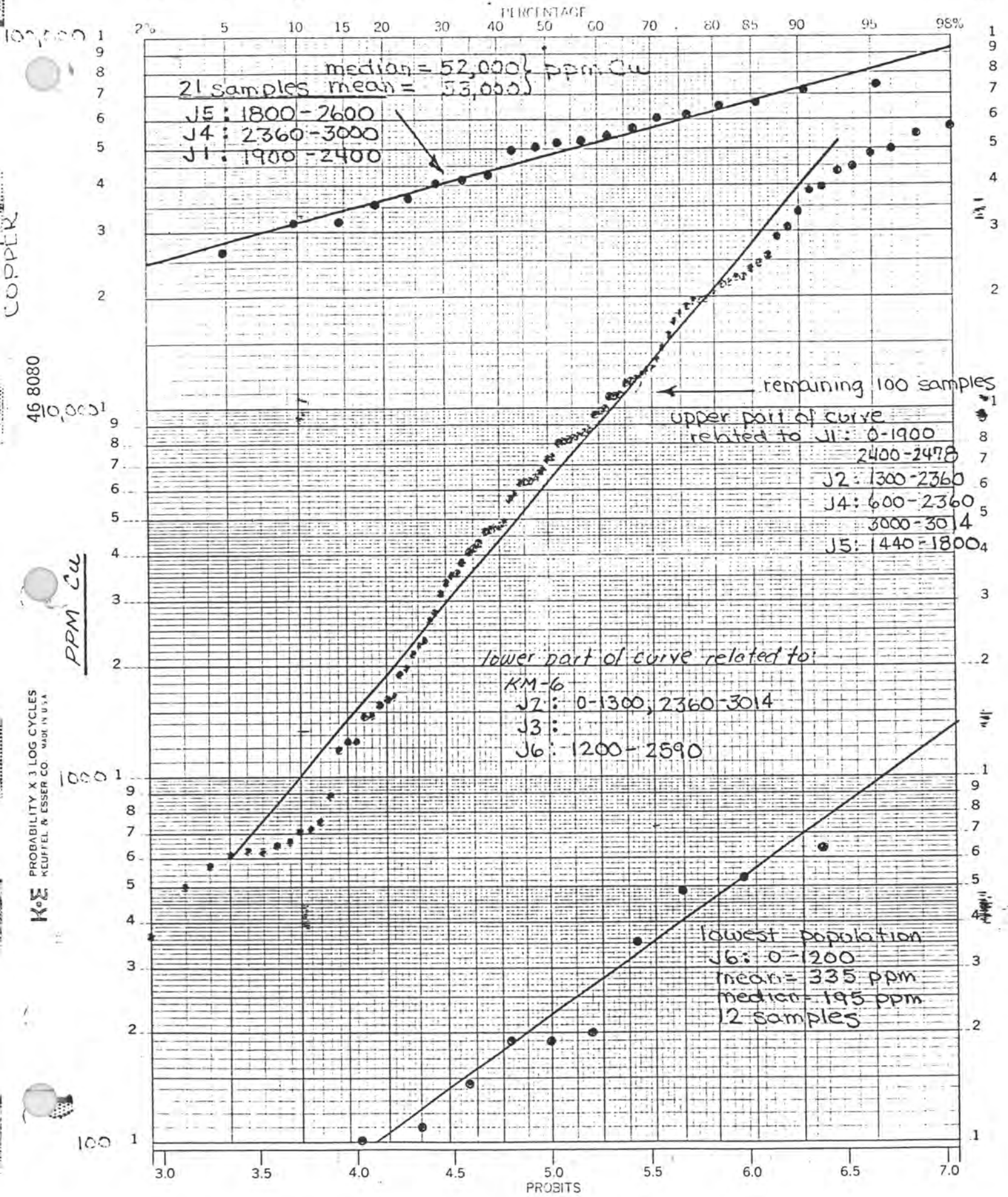
Stick up 1 box
(100 sheets)
Tur Blue.



K+E PROBABILITY X 3 LOG CYCLES 46 8080 MADE IN U.S.A. KEUFFEL & ESSER CO.

highest population (not plotted)
J5: 2600-2825 (mean = 94,700 ppm)
(3 samples)

COPPER



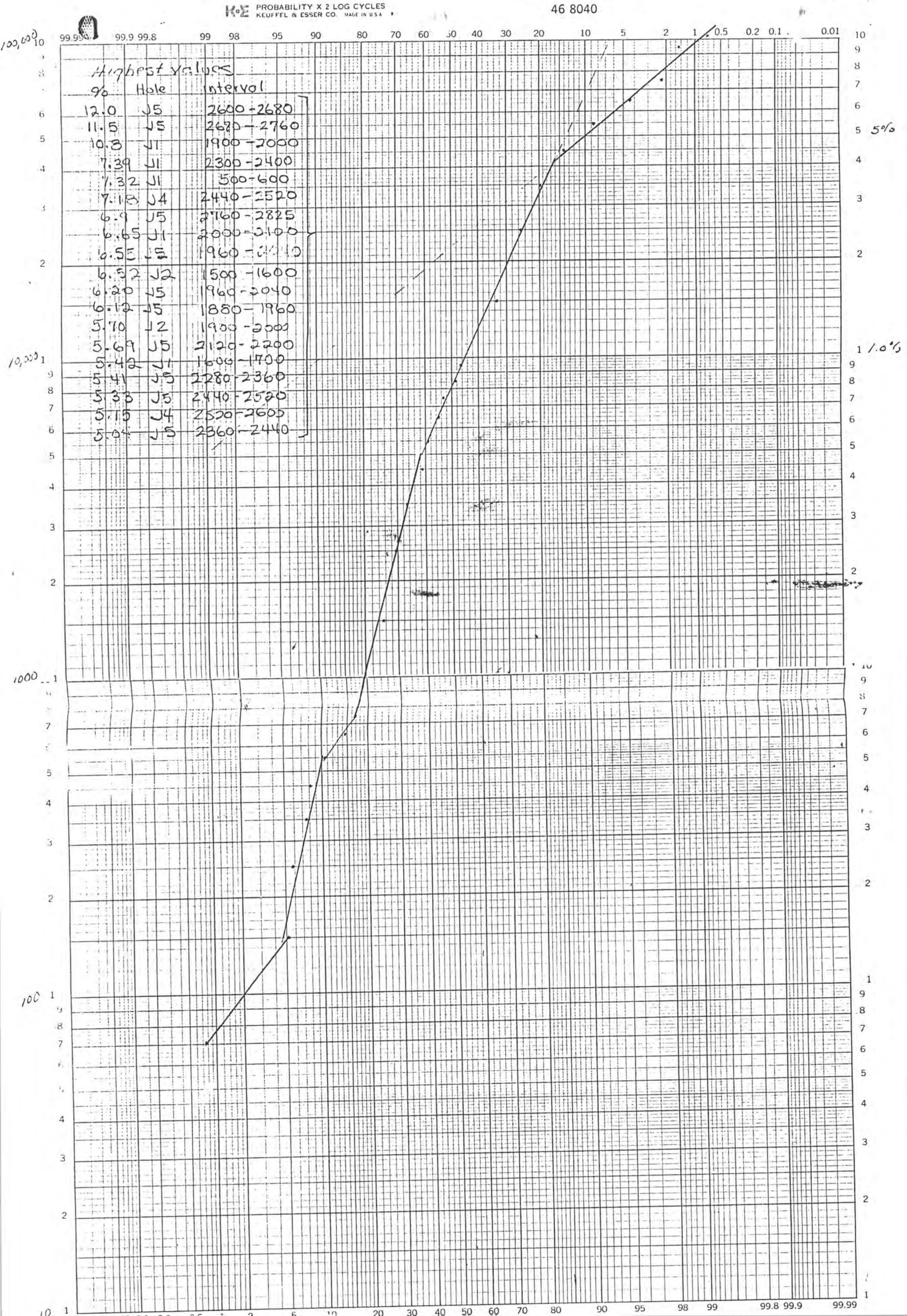
K&E PROBABILITY X 3 LOG CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8080

156 samples

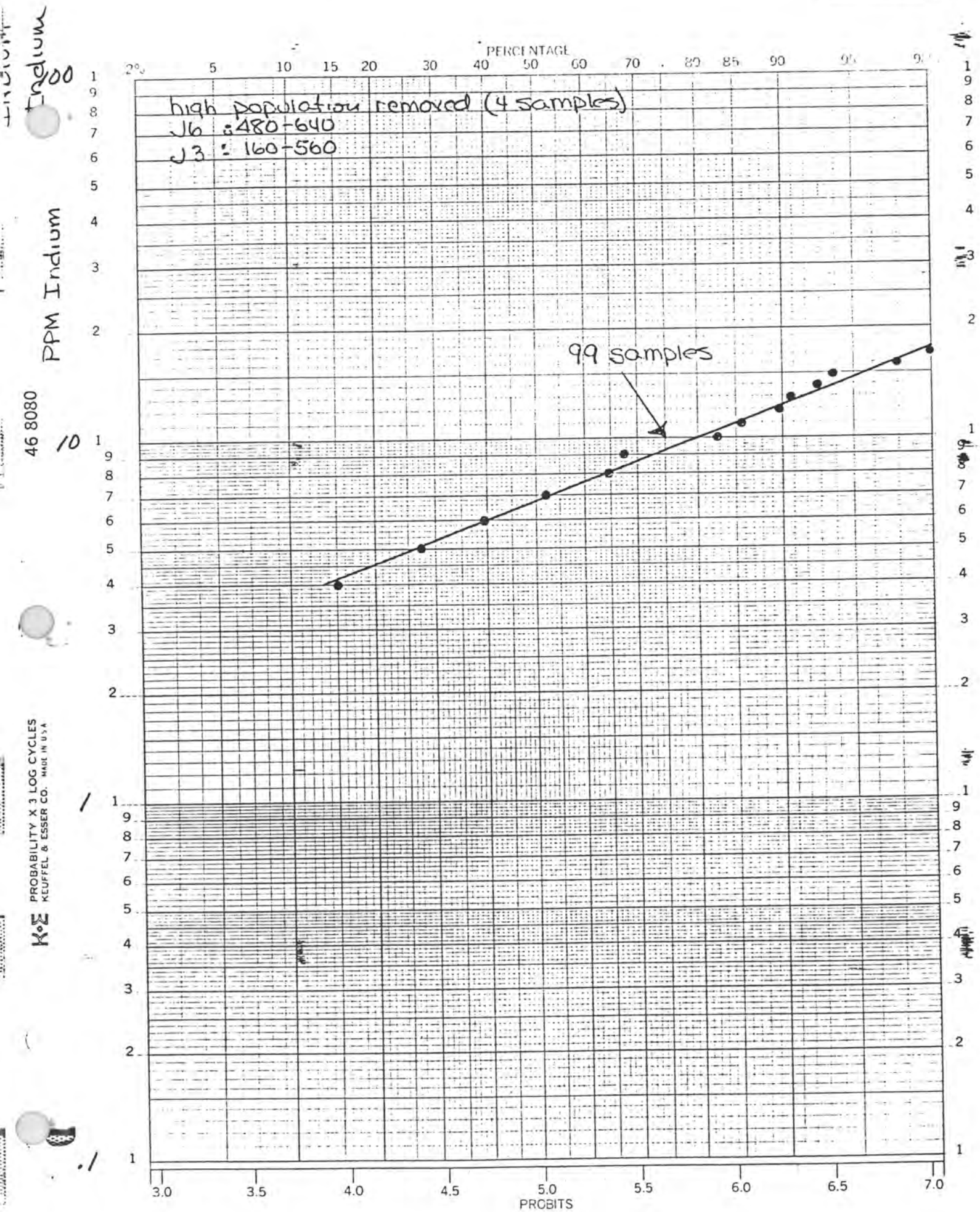
COPPER

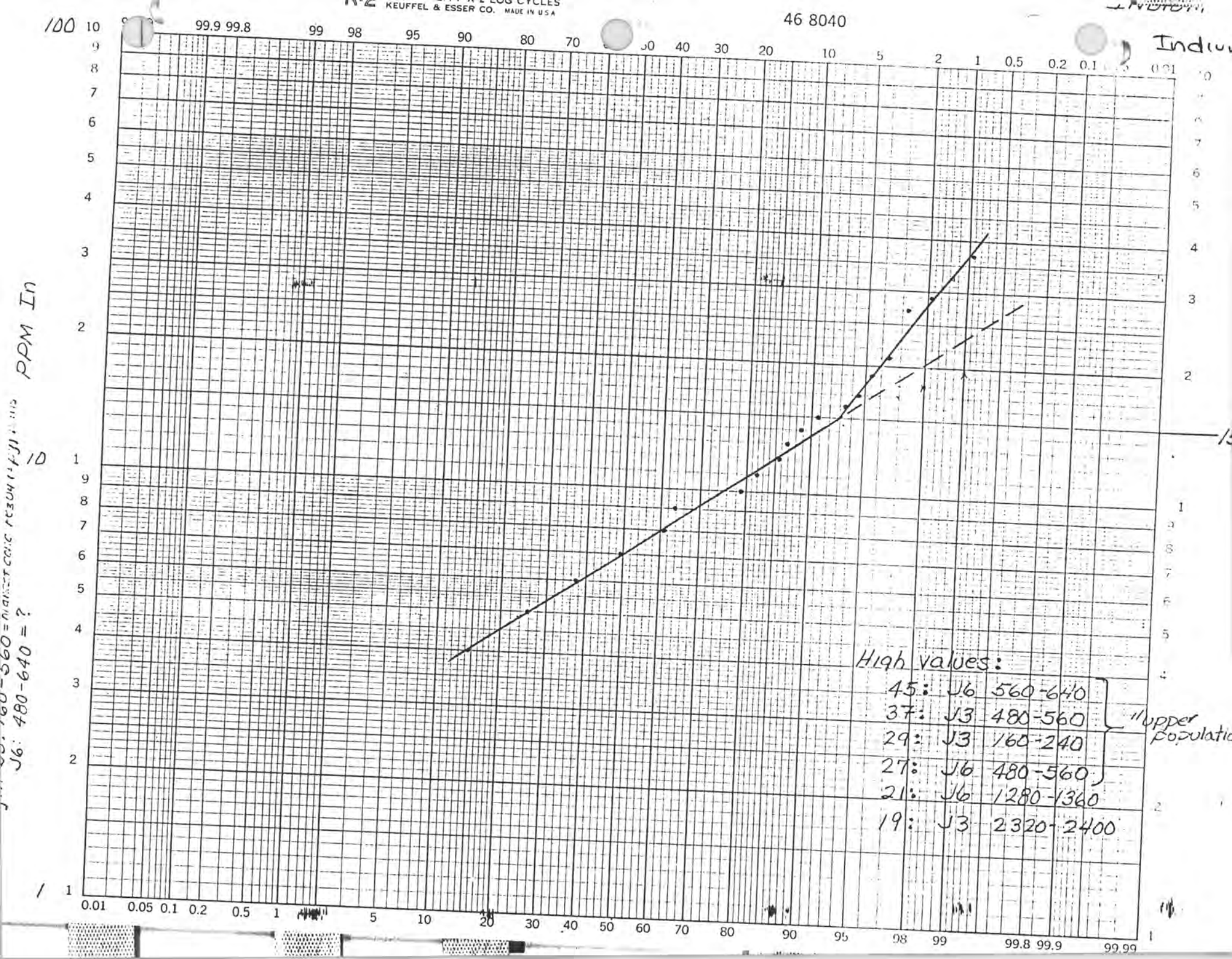
K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040

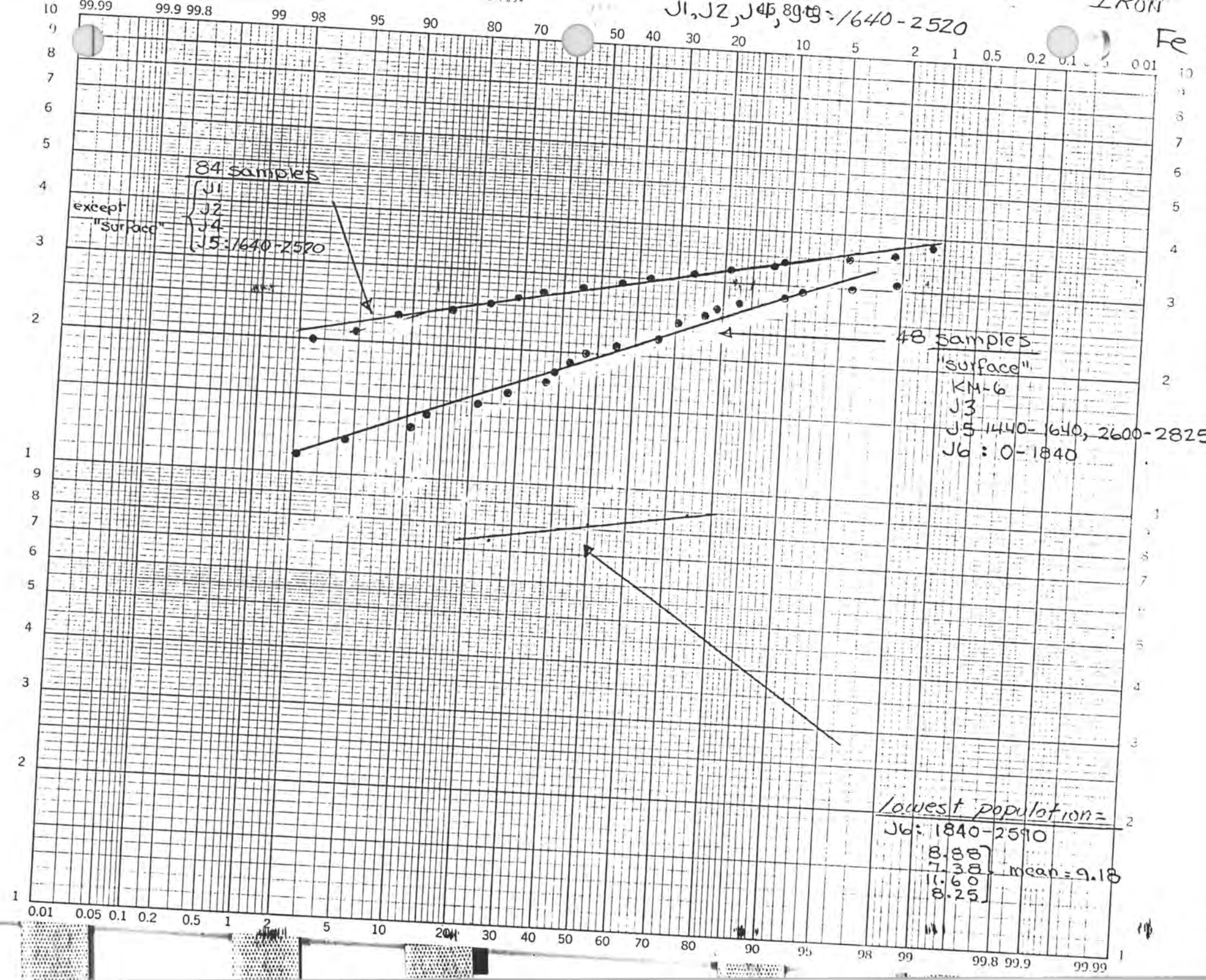


INDIUM

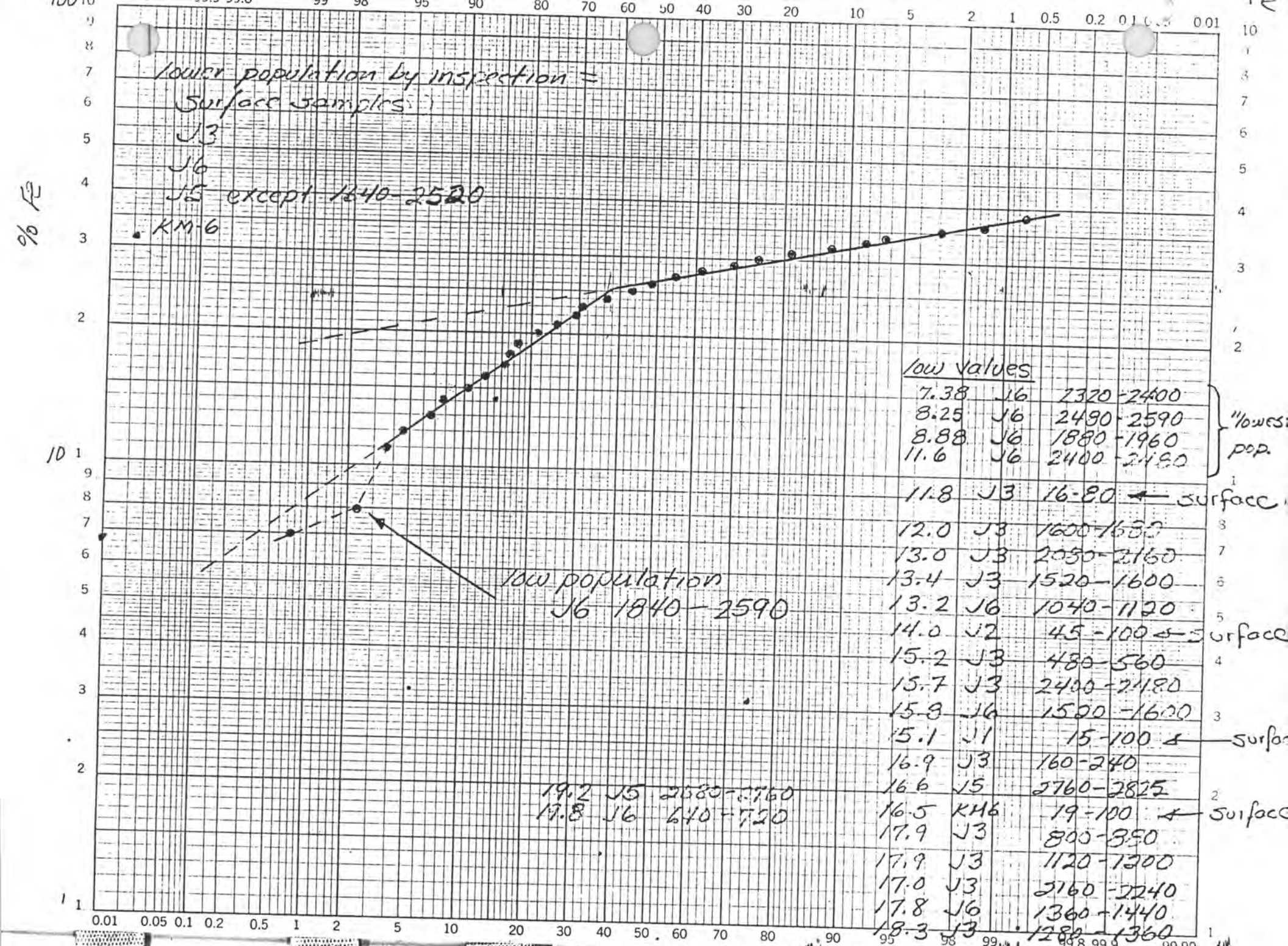

PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98
PPM Indium
100
10
1
.1
high population removed (4 samples)
J6 : 480-640
J3 : 160-560
99 samples
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBITS
46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

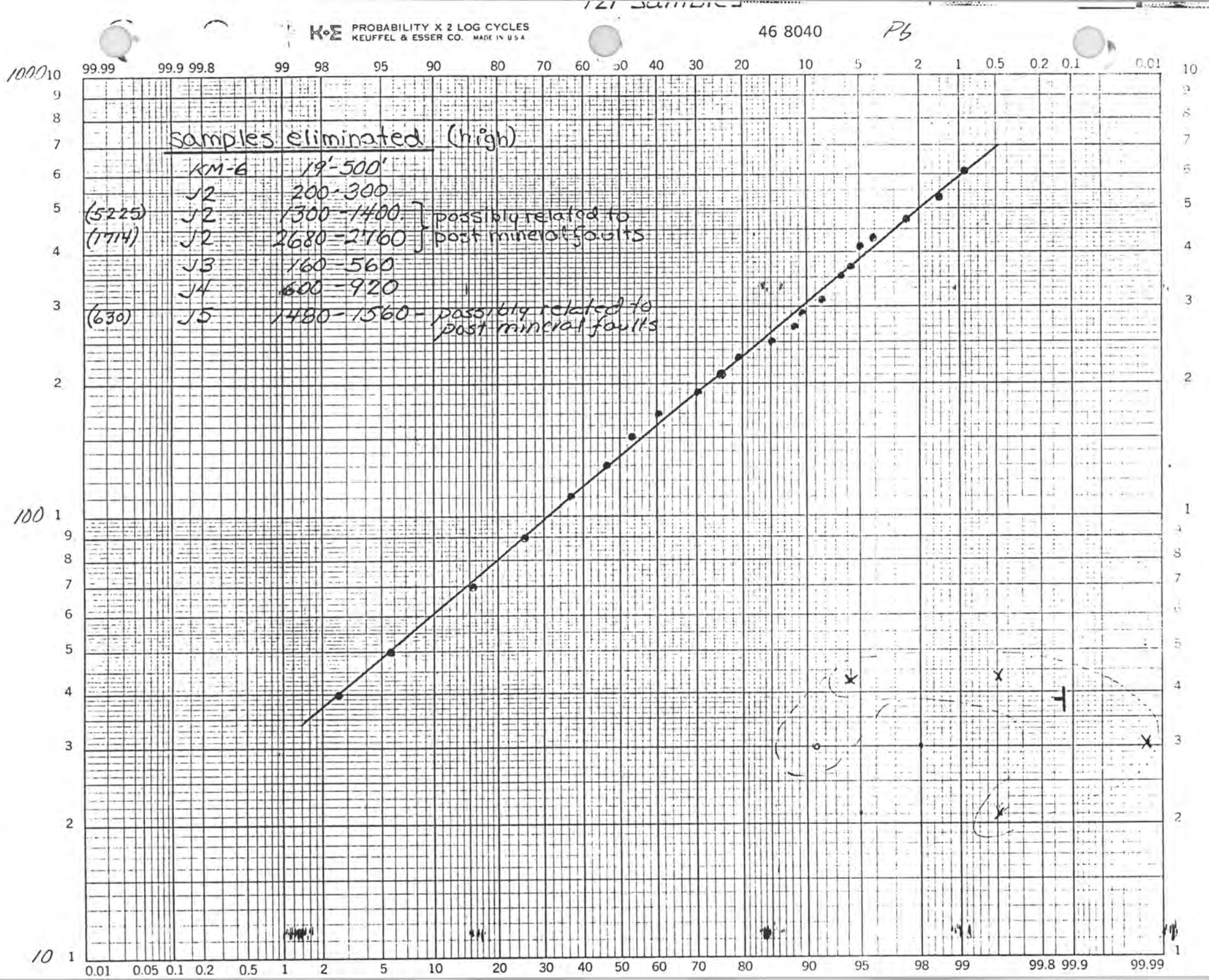


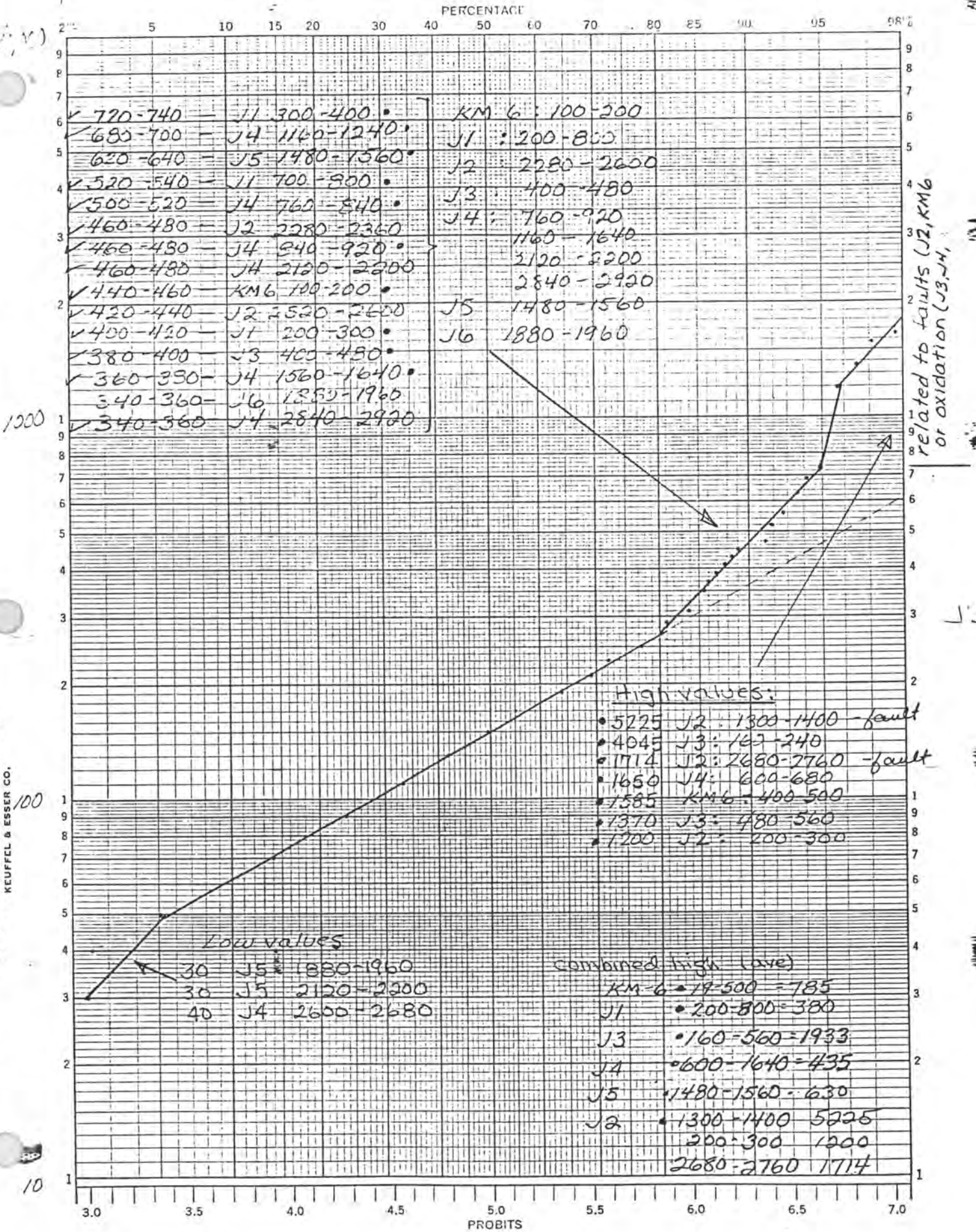
K-2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
Indiv
PPM In
J6: 480-640 = ?
High values:
45: J6 560-640
37: J3 480-560
29: J3 160-240
27: J6 480-560
21: J6 1280-1360
19: J3 2320-2400
"upper populatio



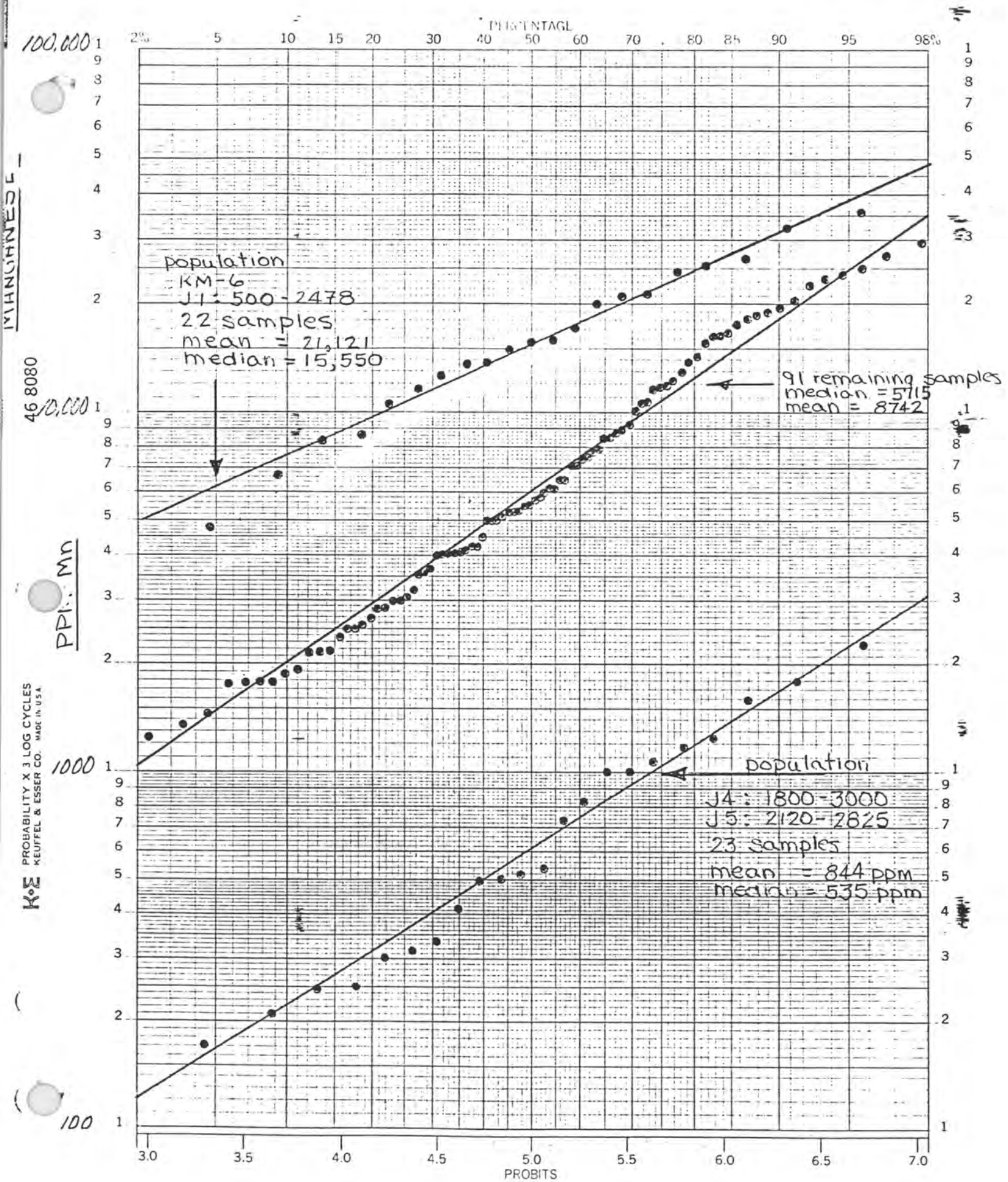
J1, J2, J4, J5: 1640-2520
IRON
Fe
84 samples
except "surface"
J1
J2
J4
J5: 1640-2520
48 samples
"surface"
KM-6
J3
J5 1440-1640, 2600-2825
J6 : 0-1840
lowest population =
J6: 1840-2590
8.88
7.38
11.60
8.25
mean = 9.18


lower population by inspection =
Surface samples
J3
J6
J5 except 1840-2520
KM-6
low population
J6 1840-2590
19.2 J5 2580-2760
19.8 J6 640-720
% ≤
low values
7.38 J6 2320-2400
8.25 J6 2490-2590
8.88 J6 1880-1960
11.6 J6 2400-2480
"lowest" pop.
11.8 J3 16-80 ← surface
12.0 J3 1600-1680
13.0 J3 2080-2160
13.4 J3 1520-1600
13.2 J6 1040-1120
14.0 J2 45-100 ← surface
15.2 J3 480-560
15.7 J3 2400-2480
15.8 J6 1520-1600
15.1 J1 15-100 ← surface
16.9 J3 160-240
16.6 J5 2760-2825
16.5 KM6 19-100 ← surface
17.9 J3 800-850
17.9 J3 1120-1200
17.0 J3 2160-2240
17.8 J6 1360-1440
18.3 J3 1280-1360


K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
Pb
samples eliminated (high)
KM-6 19'-500'
J2 200-300
(5225) J2 1300-1400
(1714) J2 2680-2760
possibly related to post mineral faults
J3 160-560
J4 600-920
(630) J5 1480-1560 - possibly related to post mineral faults
1000
100
10

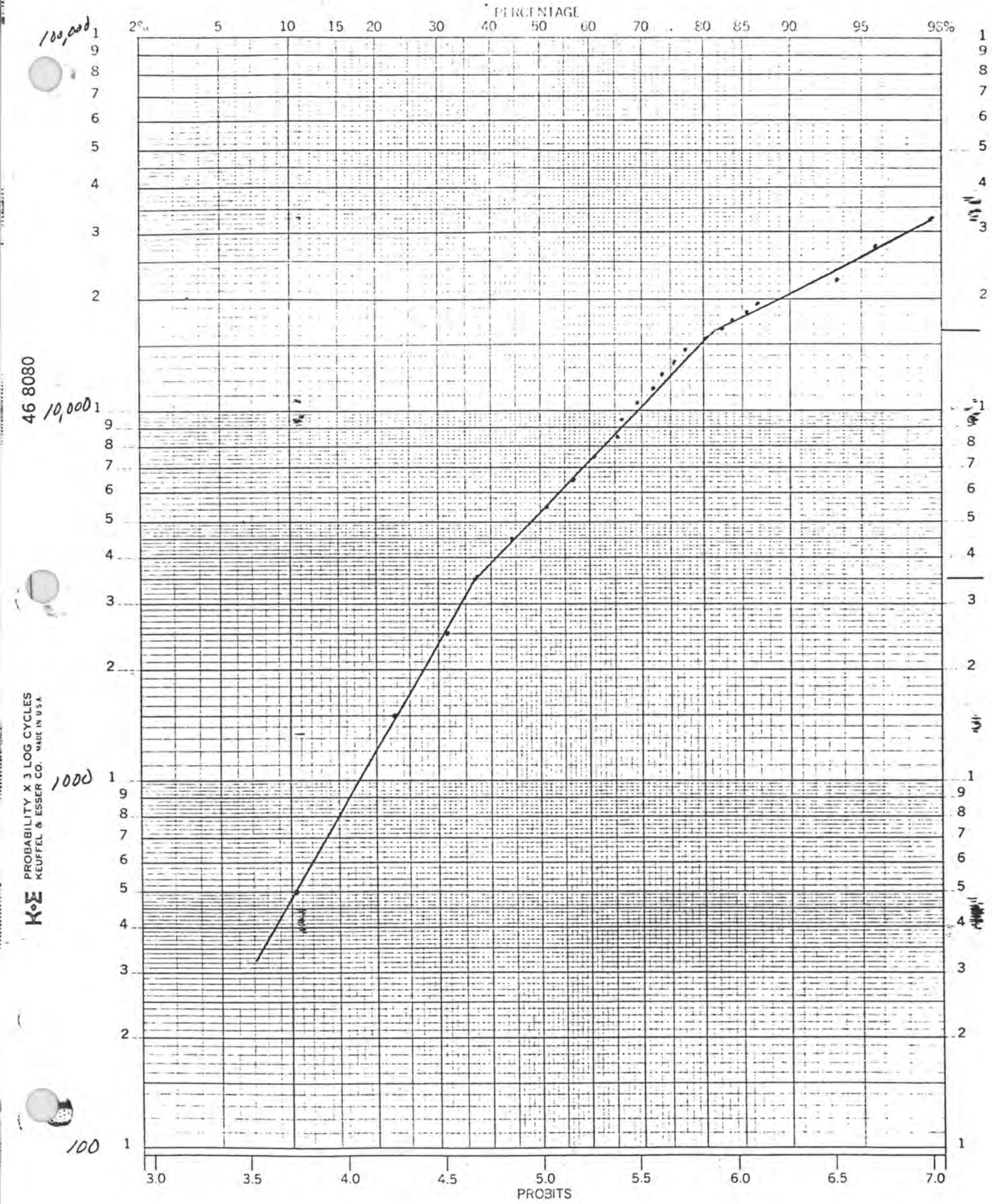

PERCENTAGE
PROBITS
PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.
46 8080
MADE IN U.S.A.
1000
100
10
720-740 — J1 300-400 •
680-700 — J4 1160-1240 •
620-640 — J5 1480-1560 •
520-540 — J1 700-800 •
500-520 — J4 760-840 •
460-480 — J2 2280-2360
460-480 — J4 840-920 •
460-480 — J4 2120-2200
440-460 — KM6 100-200 •
420-440 — J2 2520-2600
400-420 — J1 200-300 •
380-400 — J3 400-480 •
360-380 — J4 1560-1640 •
340-360 — J6 1880-1960
340-360 — J4 2840-2920
KM 6 : 100-200
J1 : 200-800
J2 : 2280-2600
J3 : 400-480
J4 : 760-920
1160-1640
2120-2200
2840-2920
J5 1480-1560
J6 1880-1960
related to faults (J2, KM6 or oxidation (J3, J4,
High values:
• 5225 J2 : 1300-1400 - fault
• 4045 J3 : 160-240
• 1714 J2 : 2680-2760 - fault
• 1650 J4 : 600-680
• 1585 KM6 : 400-500
• 1370 J3 : 480-560
• 1200 J2 : 200-300
Low values
30 J5 1880-1960
30 J5 2120-2200
40 J4 2600-2680
Combined high (ave)
KM-6 • 19-500 = 785
J1 • 200-800 = 380
J3 • 160-560 = 1933
J4 • 600-1640 = 435
J5 • 1480-1560 = 630
J2 • 1300-1400 5225
200-300 1200
2680-2760 1714

MANGANESE

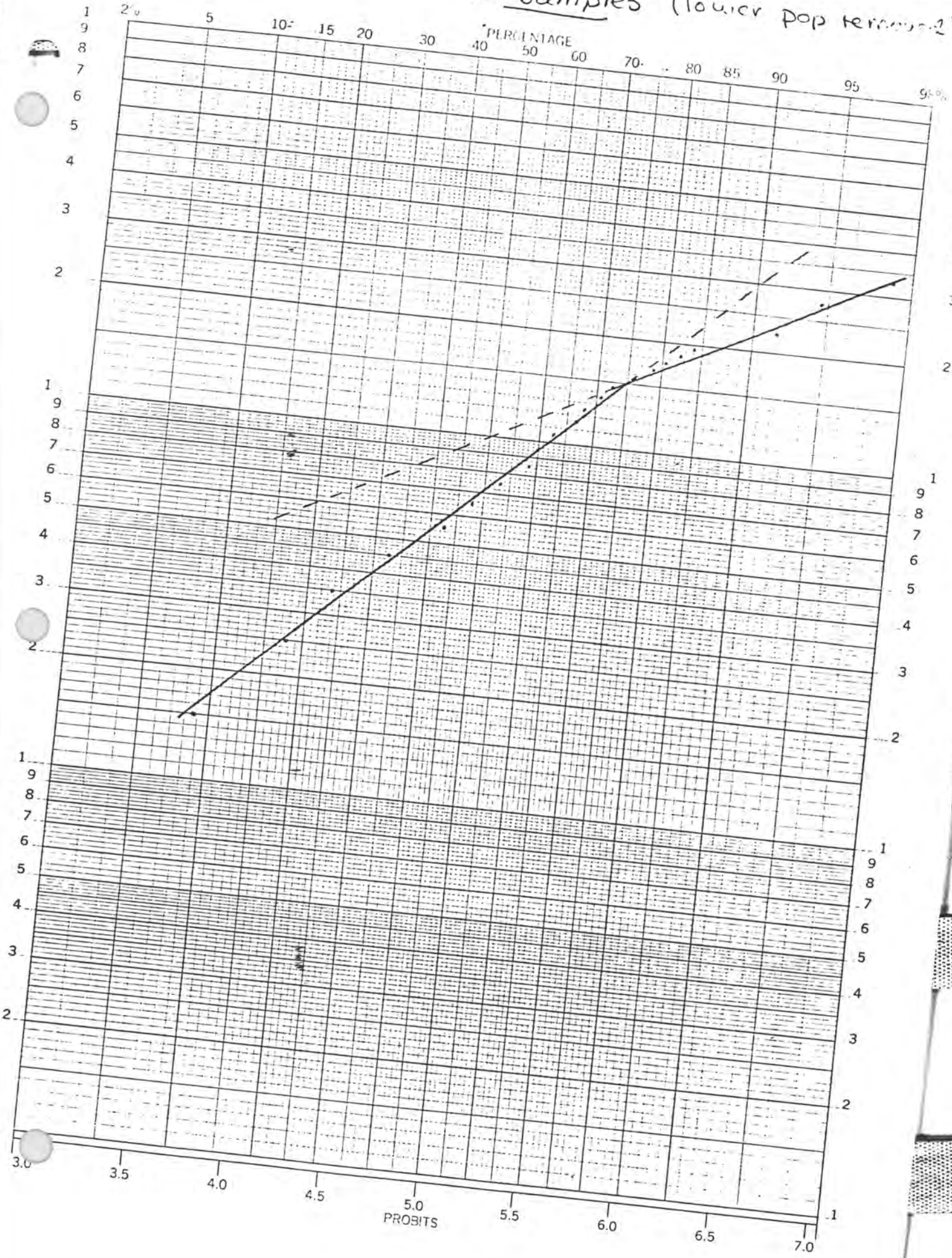

PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
100,000
10,000
1000
100
PPM Mn
population
KM-6
J1: 500-2478
22 samples
mean = 21,121
median = 15,550
91 remaining samples
median = 5715
mean = 8742
population
J4: 1800-3000
J5: 2120-2825
23 samples
mean = 844 ppm
median = 535 ppm
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBITS
MANGANESE
46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

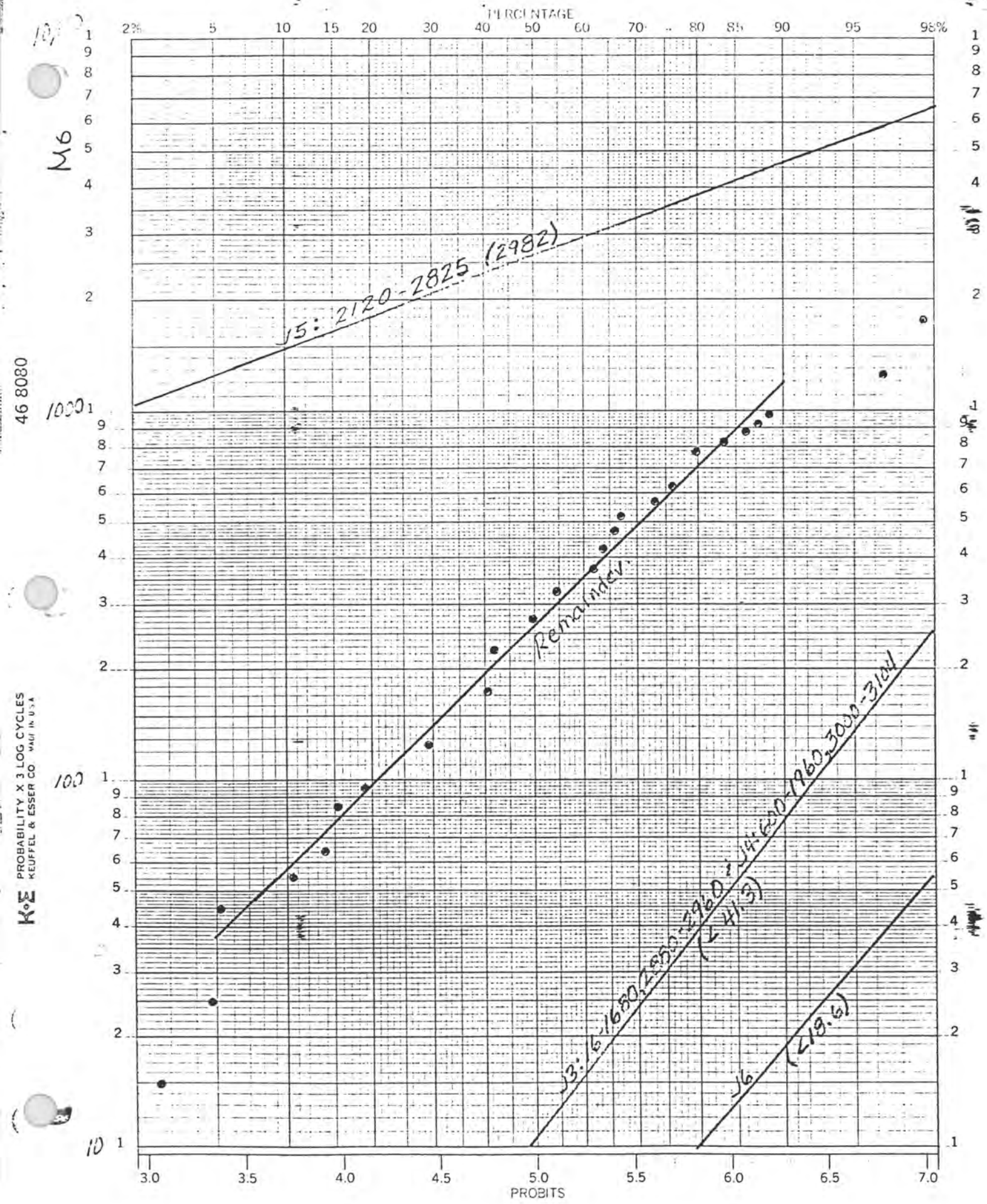
Mn

136 Samples

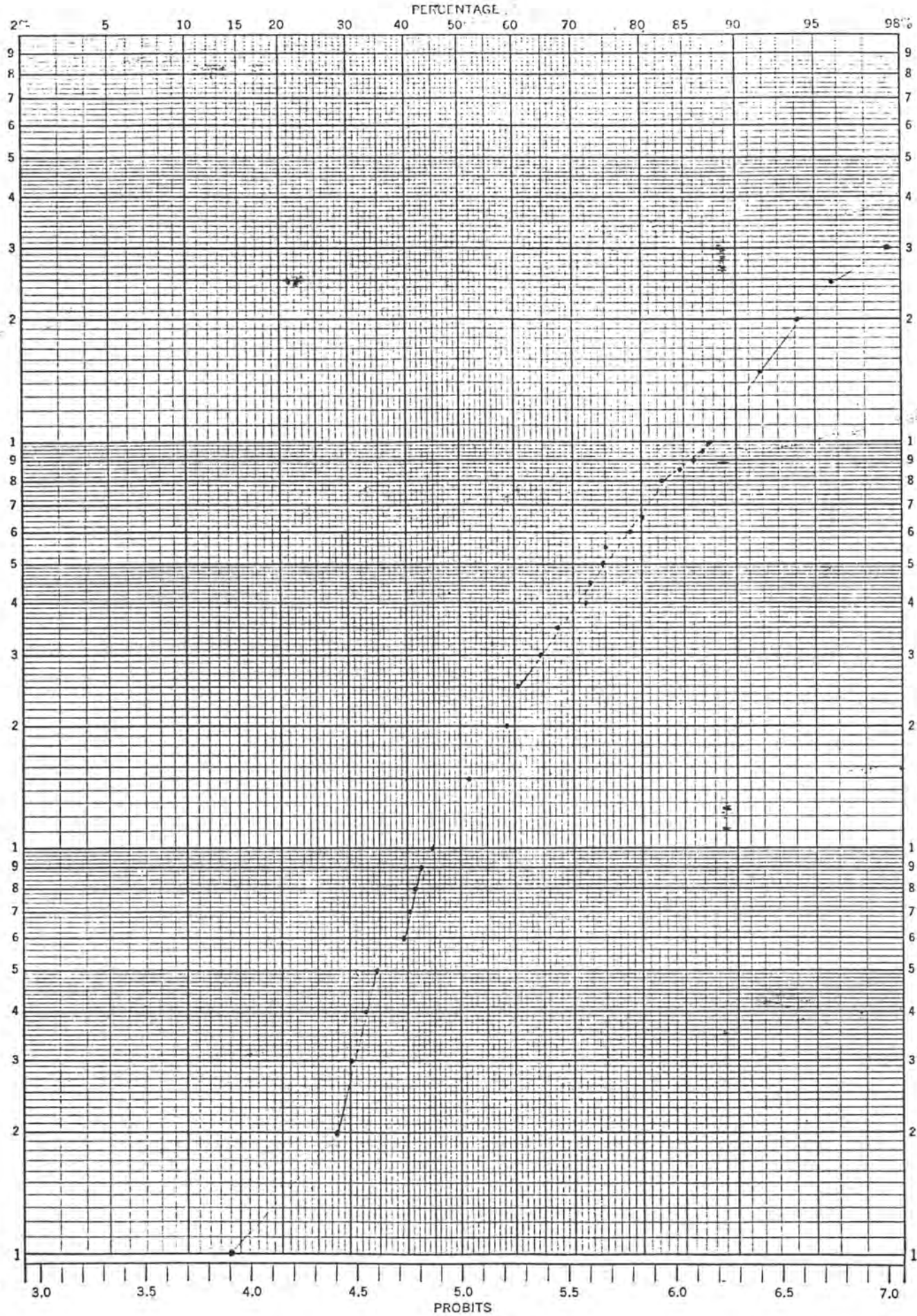


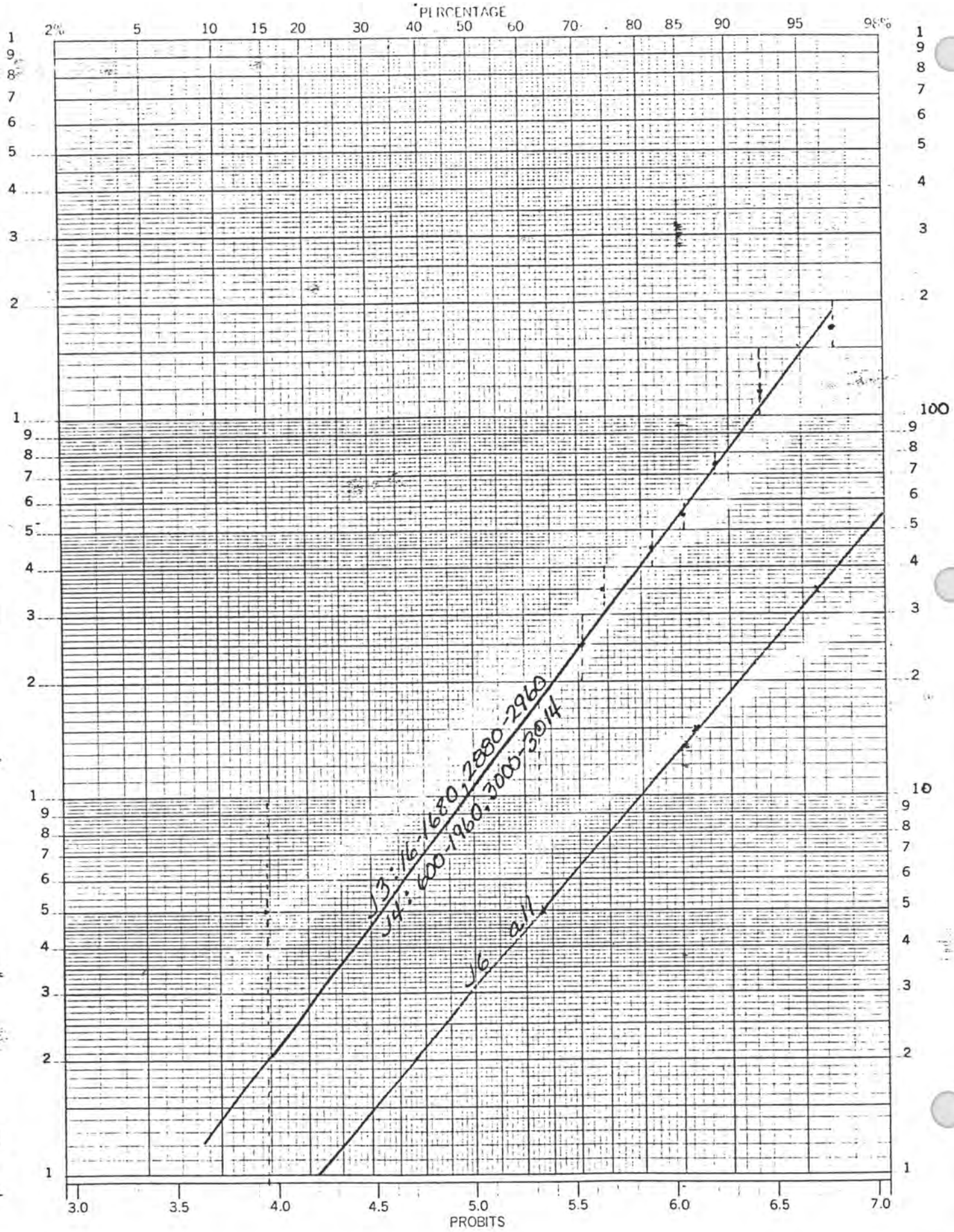
113 Samples (lower pop removed)




PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
M6
J5: 2120-2825 (2982)
Remainder.
J3: 16-1680, 2880-2960 & J4: 600-1960, 3000-3104
(<41.3)
J6 (<18.6)
1000
100
10
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBITS
46 8080
K&E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

Mo
136


PERCENTAGE
2 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
PROBITS
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBABILITY
X 3 LOG CYCLES
KEUFFEL & ESSER CO.
MADE IN U.S.A.

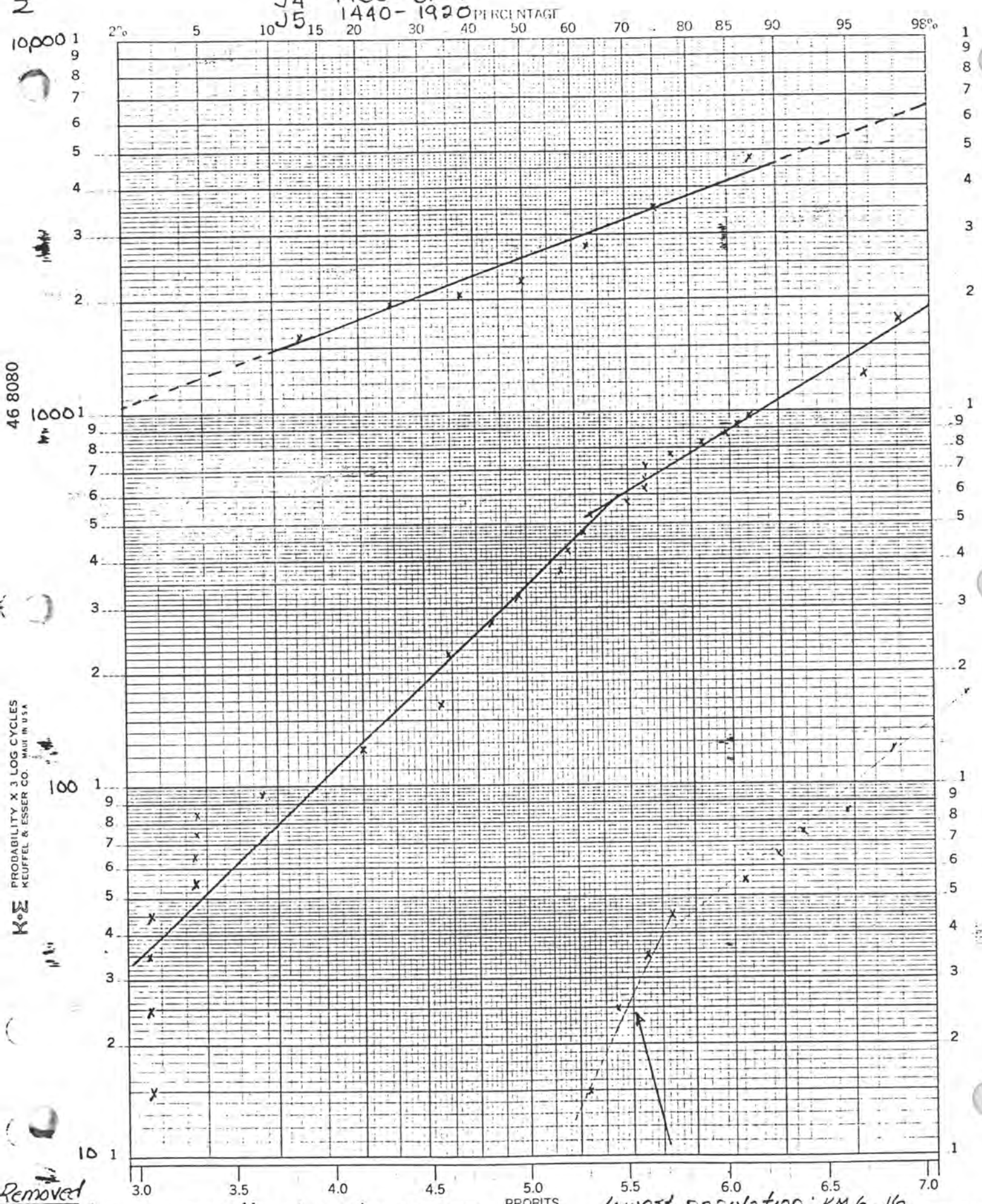


PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
PROBITS
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
J3: 16-1680, 2880-2960
J4: 600-1960, 3000-3014
J6 all
46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

MoSN

samples J1
J2 1400-2680
J3 1680-2960
J4 1960-3104
J5 1440-1920

Mo



Removed

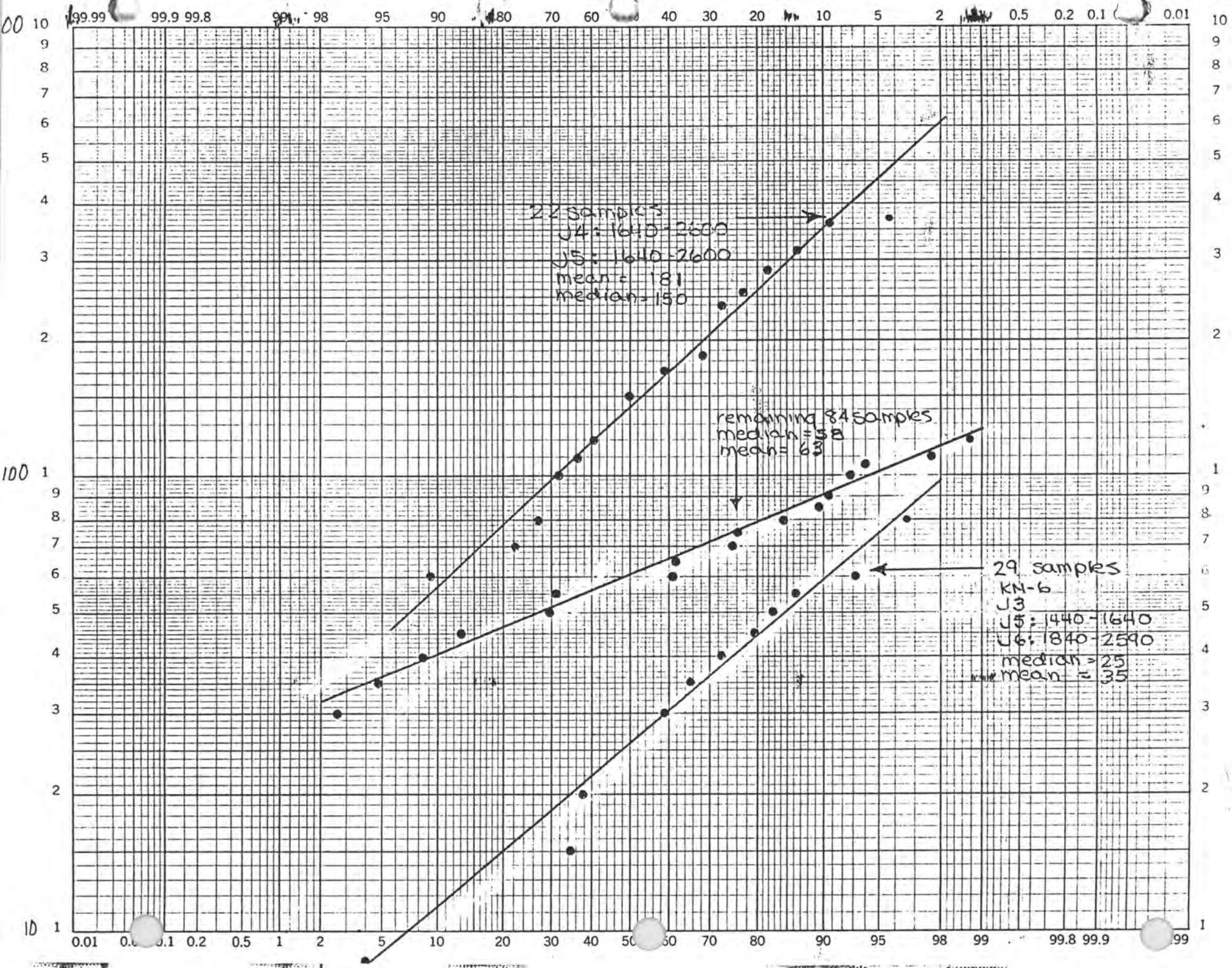
Highest population (2982) = J5: 2120-2825

lowest population: KM 6, J6
J2: 45-1400, 2680-3014
J3: 16-1680

K•E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN USA

46 8040

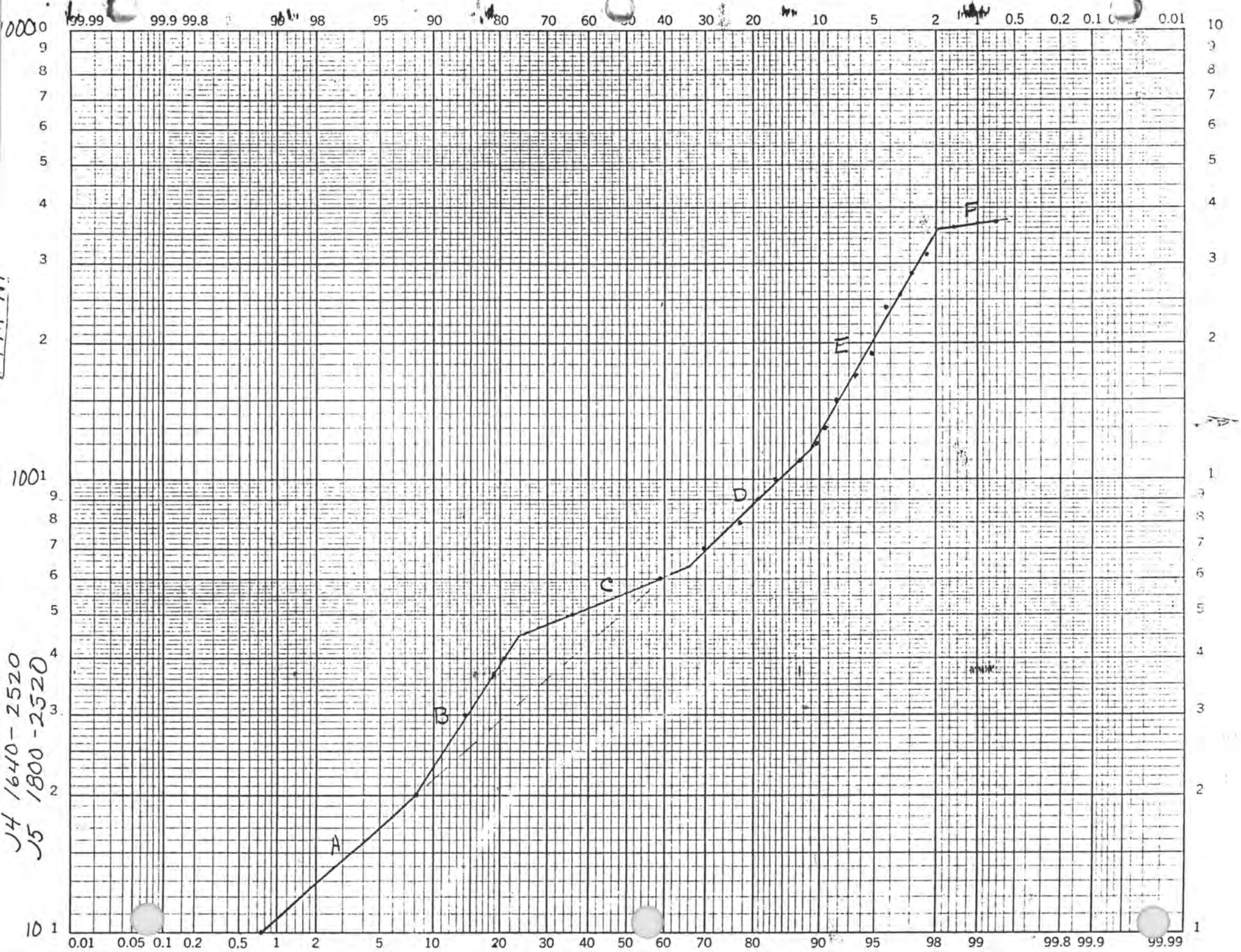
NICKEL



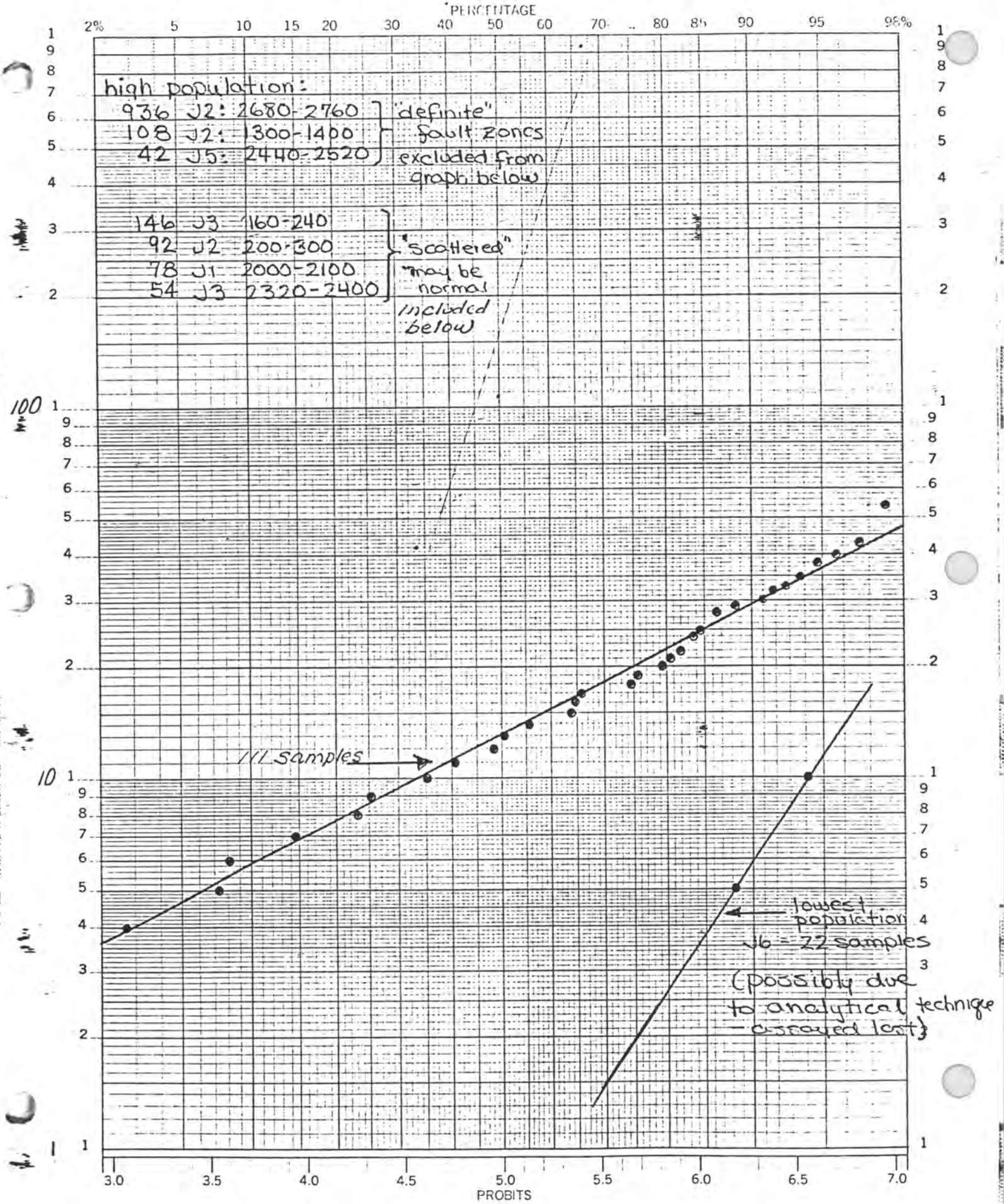
K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040

NICKEL



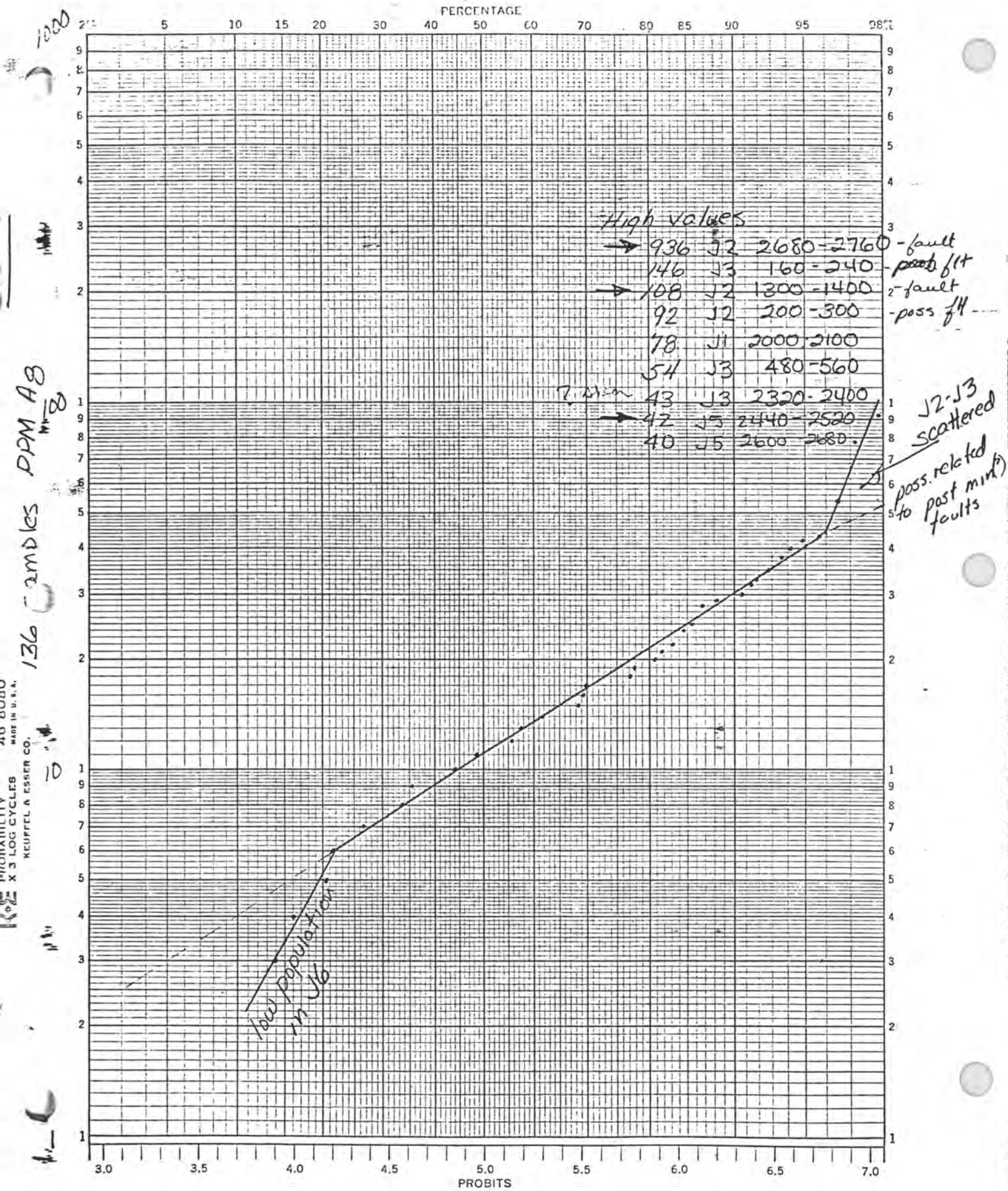
SILVER



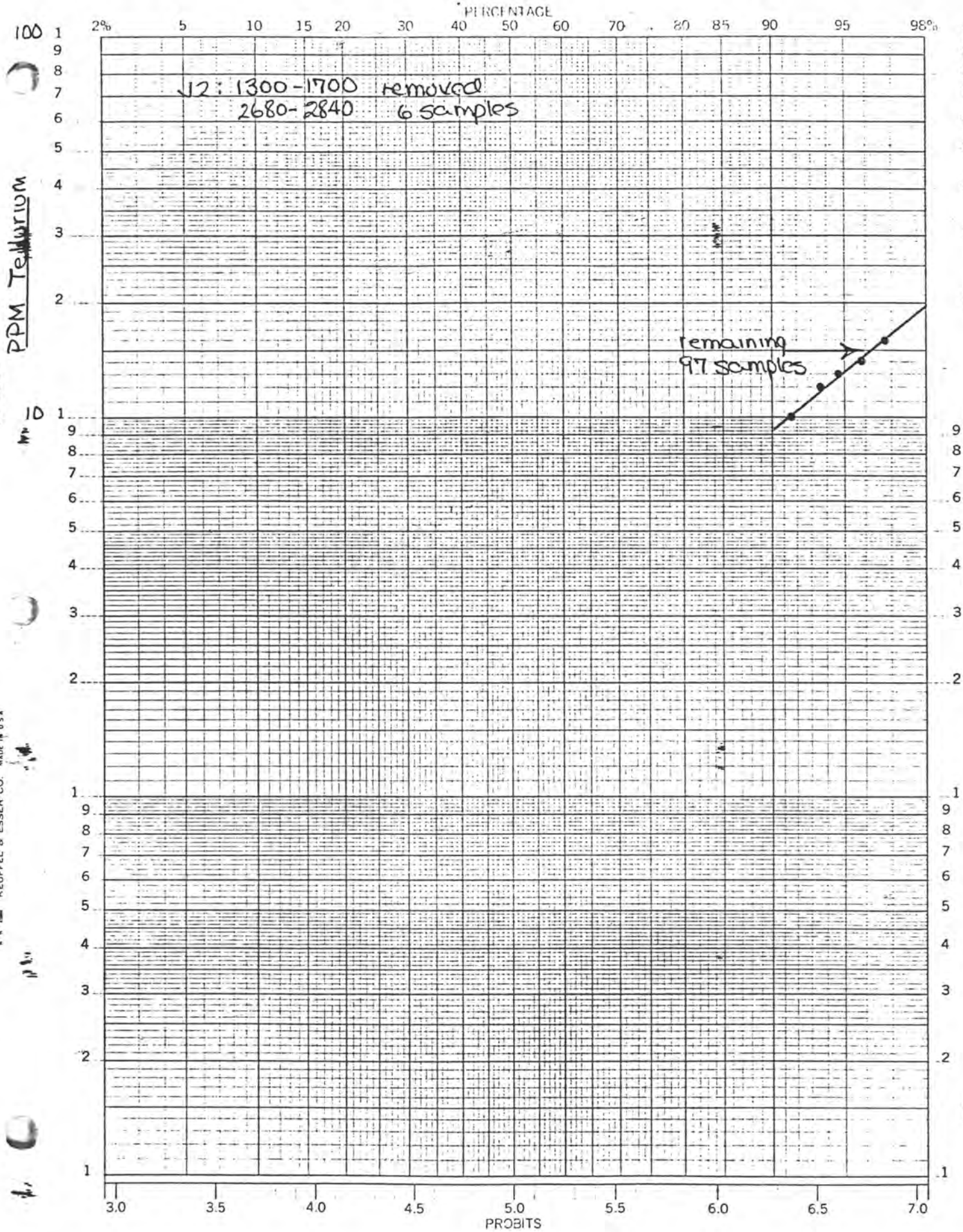
46 8080

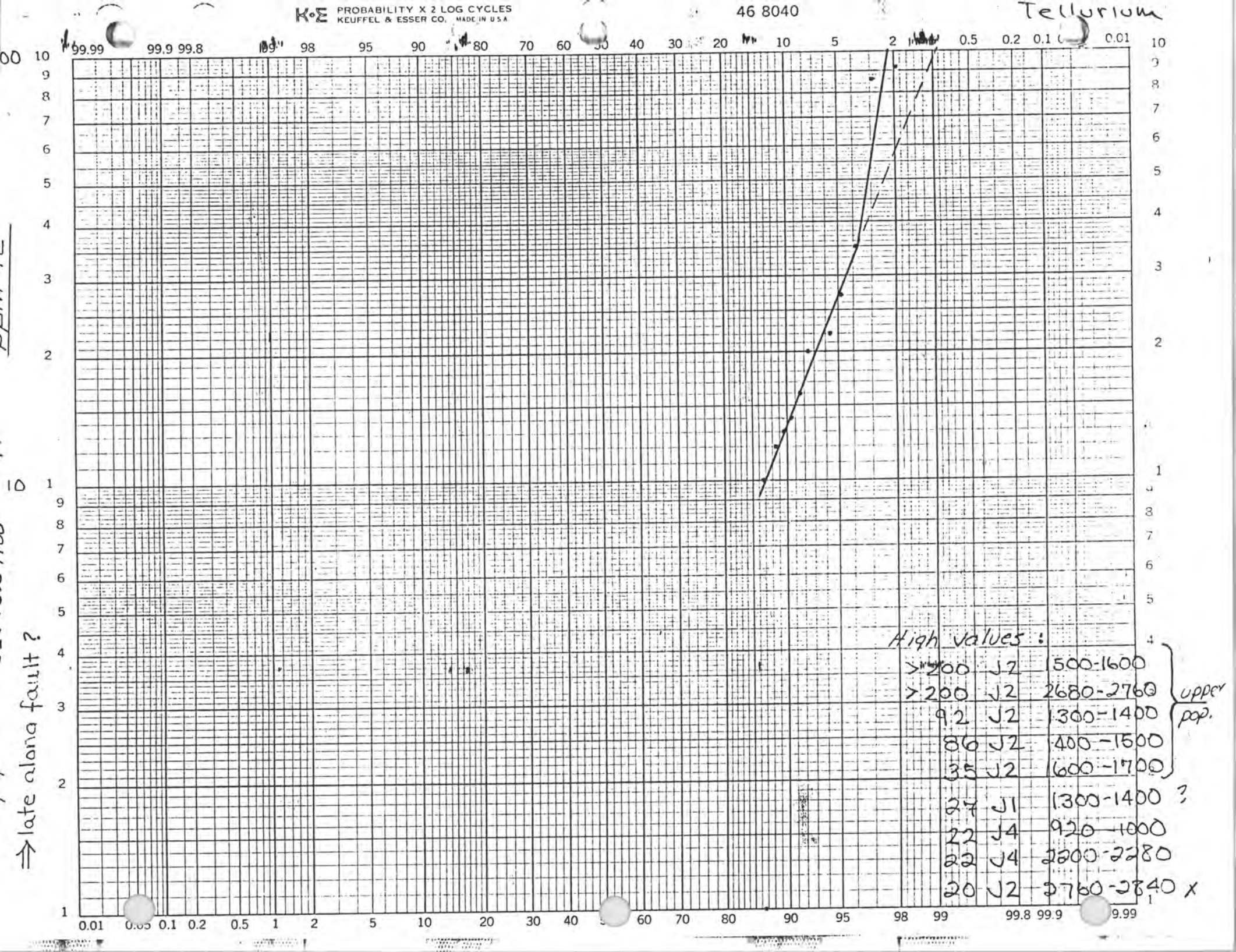
K+E PROBABILITY X 3 LOG CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.

(Ag) Silver

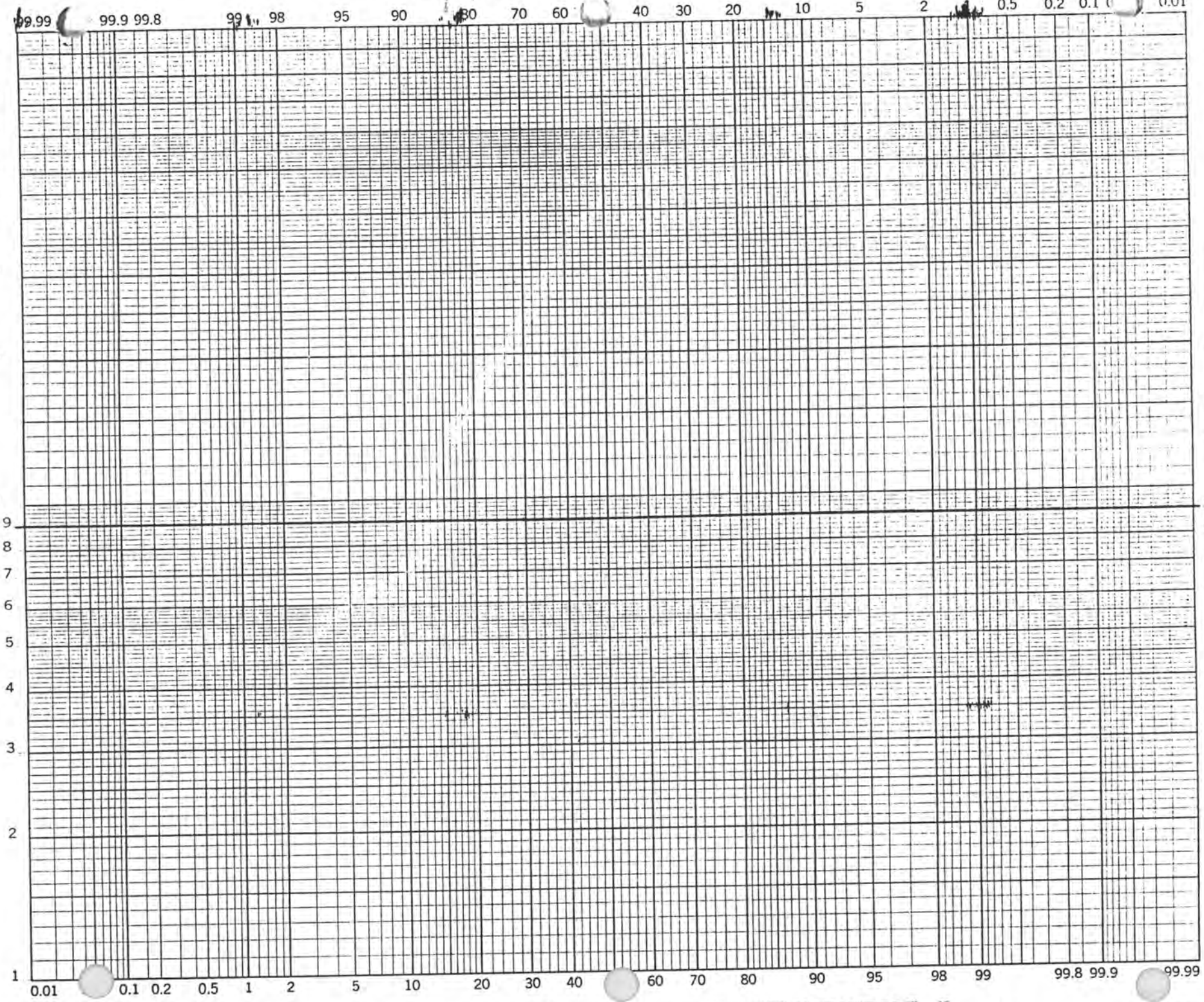

PERCENTAGE
PROBITS
PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO.
MADE IN U.S.A.
1000
100
10
1
136 samples PPM Ag
High values
936 J2 2680-2760 - fault
146 J3 160-240 - poss flt
108 J2 1300-1400 - fault
92 J2 200-300 - poss flt
78 J1 2000-2100
54 J3 480-560
? 43 J3 2320-2400
42 J5 2440-2520
40 J5 2600-2680
J2-J3 scattered
poss. related to past min? faults
low population in J6

TELLURIUM


PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
PPM Tellurium
100
10
1
J2: 1300-1700 removed
2680-2840 6 samples
remaining
97 samples
3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
PROBITS
46 8080
K+E PROBABILITY X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.


K•E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
Tellurium
⇒ late along fault ?
High values :
>200 J2 1500-1600
>200 J2 2680-2760
92 J2 1300-1400
86 J2 1400-1500
35 J2 1600-1700
upper pop.
27 J1 1300-1400 ?
22 J4 920-1000
22 J4 2200-2280
20 J2 2760-2840 X

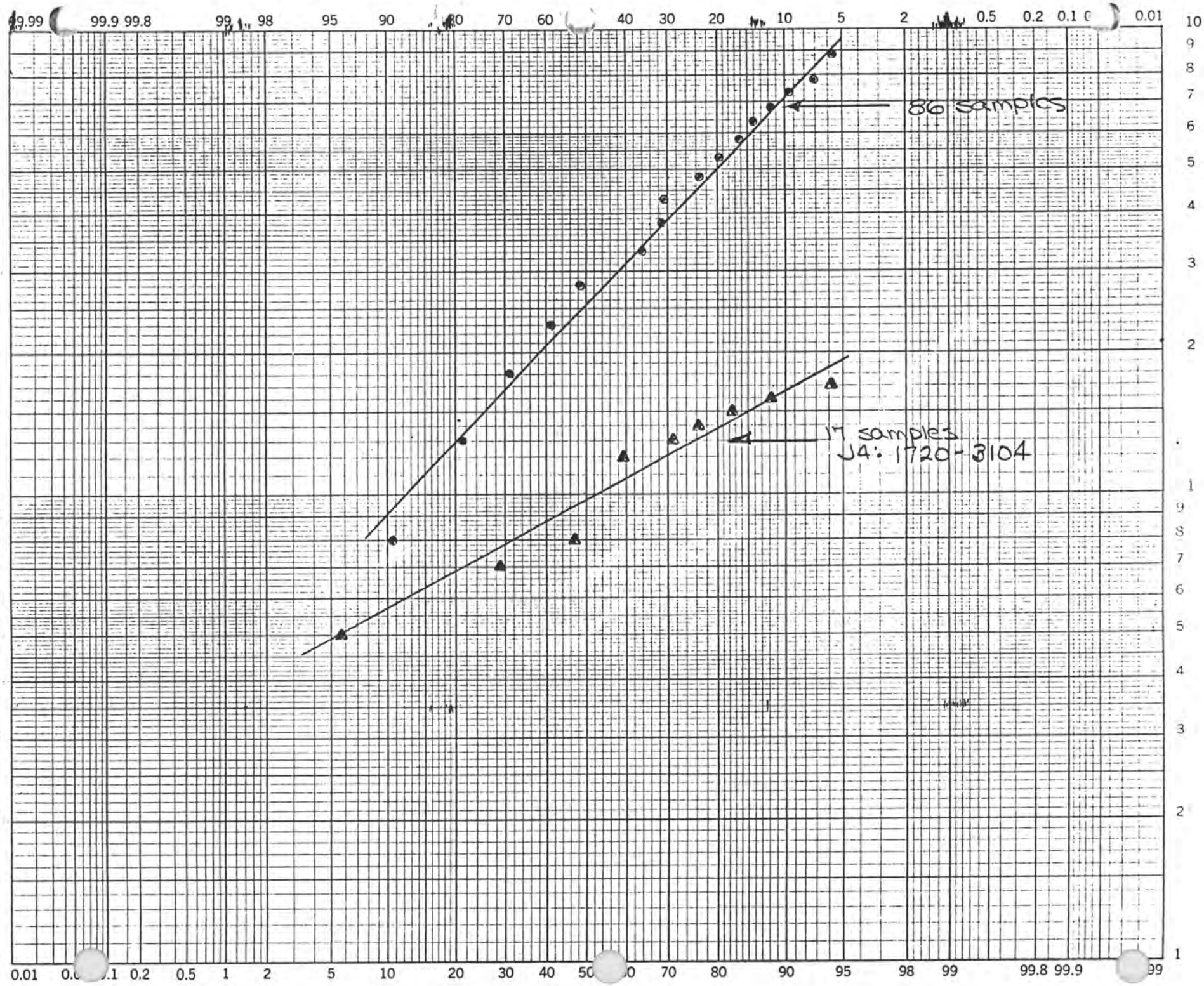
K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

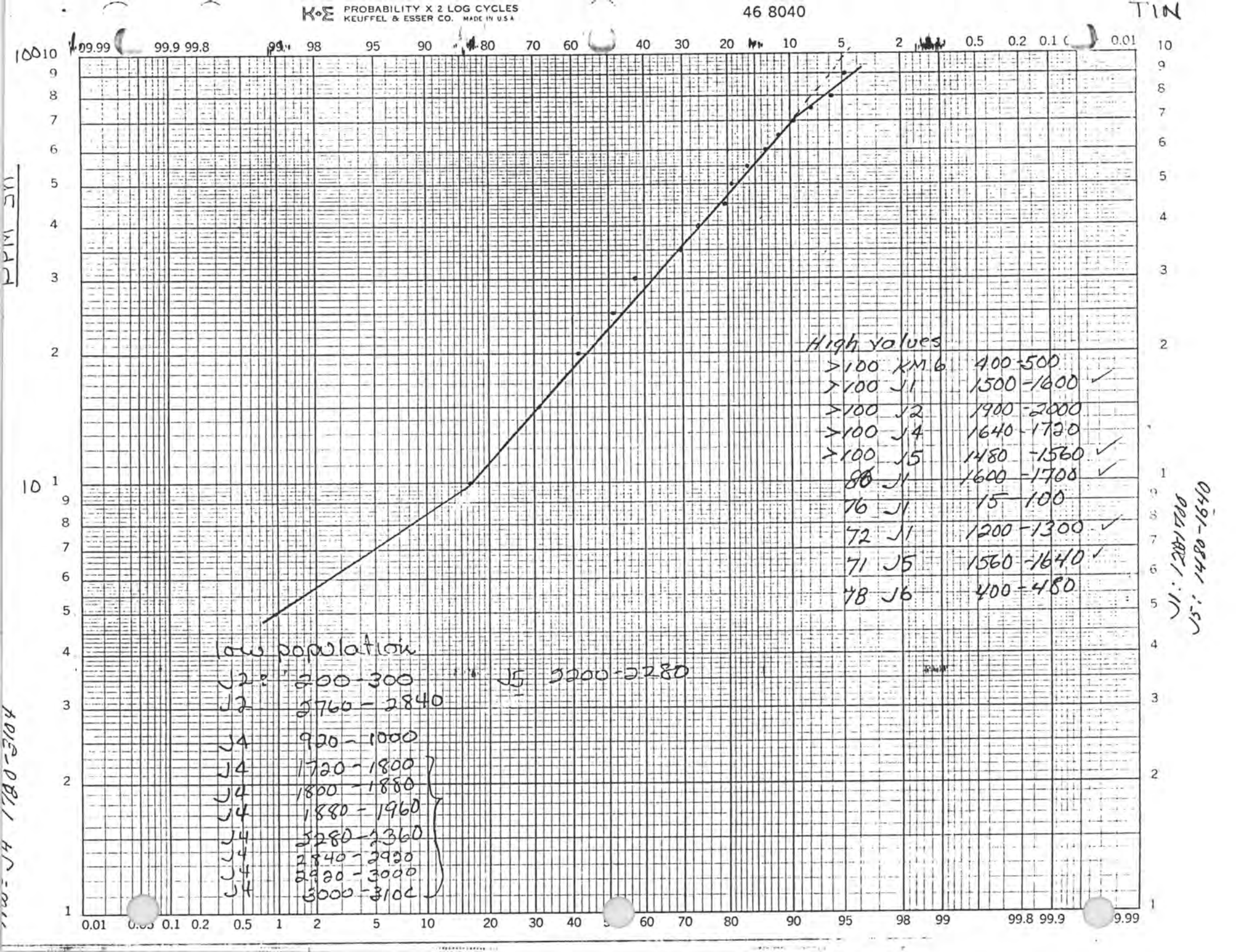


K·E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN USA

46 8040

TIN

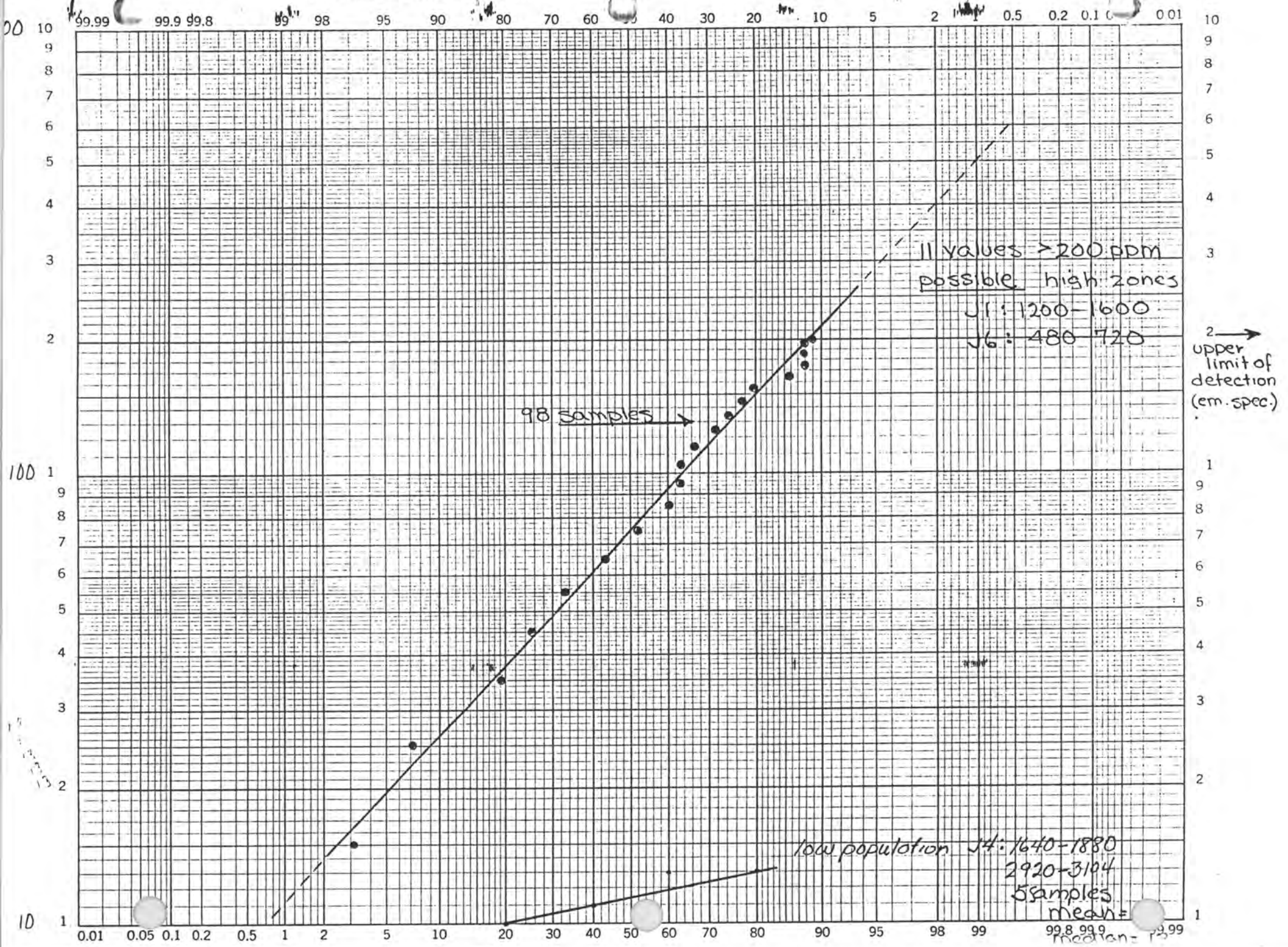



K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
TIN
PPM SN
High values
>100 KM6 400-500
>100 J1 1500-1600 ✓
>100 J2 1900-2000
>100 J4 1640-1720
>100 J5 1480-1560 ✓
86 J1 1600-1700 ✓
76 J1 15-100
72 J1 1200-1300 ✓
71 J5 1560-1640 ✓
78 J6 400-480
low population
J2: 200-300
J5 2200-2280
J2 2760-2840
J4 920-1000
J4 1720-1800
J4 1800-1880
J4 1880-1960
J4 2280-2360
J4 2840-2920
J4 2920-3000
J4 3000-3100
J1: 1200-1700
J5: 1480-1640
J4 1720-3104

K•E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040

TUNGSTEN

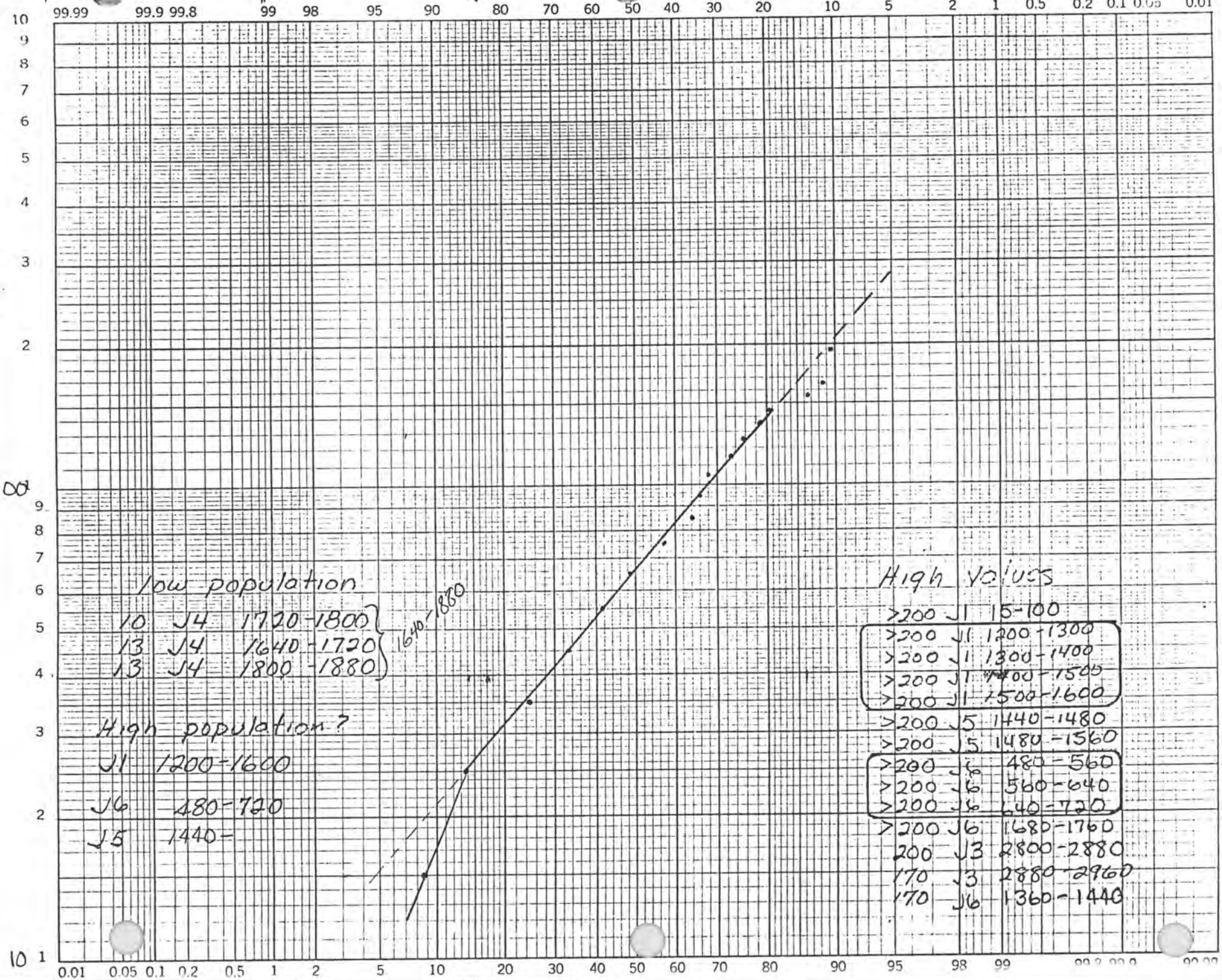


103 samples

K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040

PPM W04



Low population

10	J4	1720-1800
13	J4	1640-1720
13	J4	1800-1880

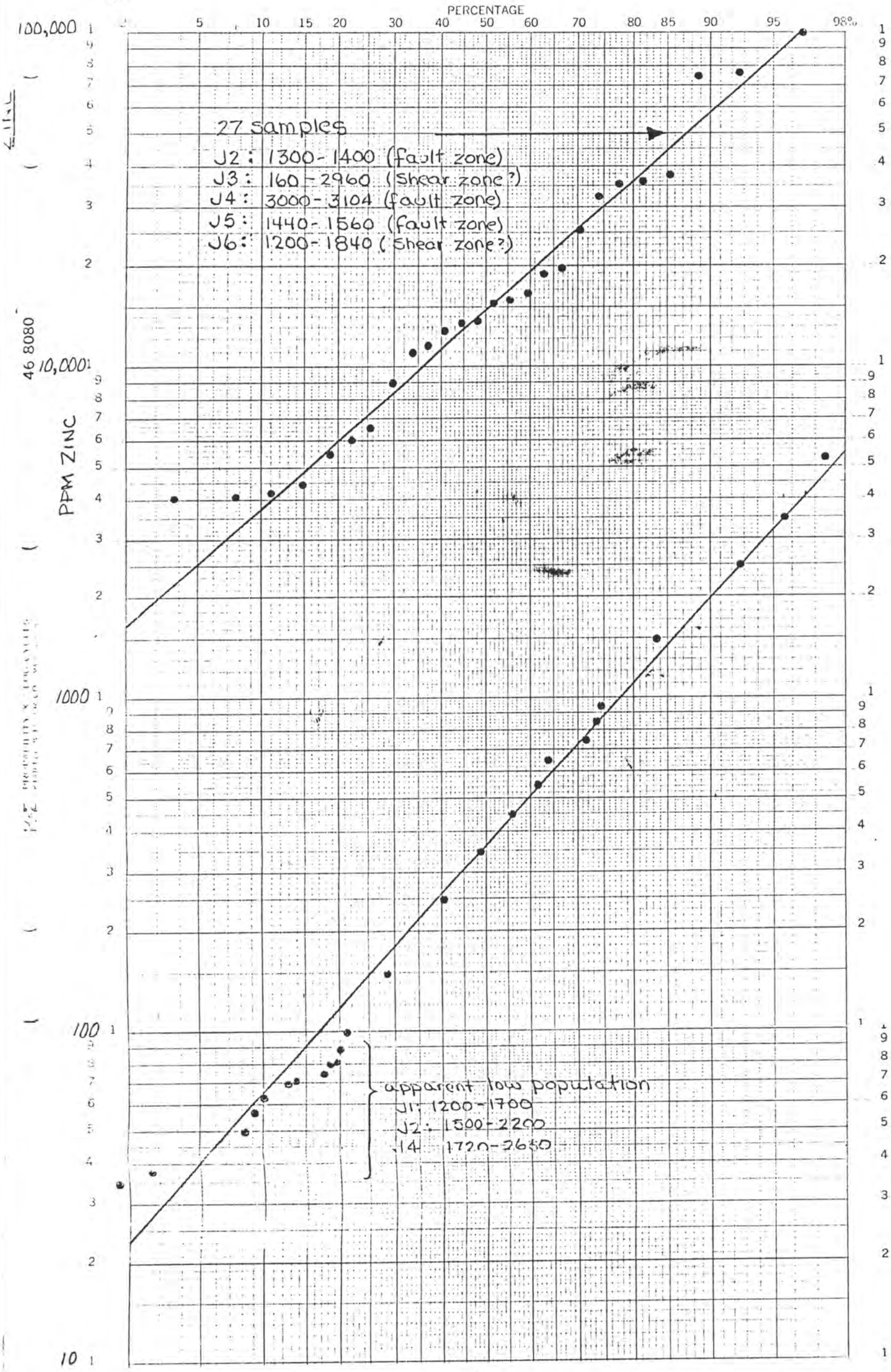
High population?

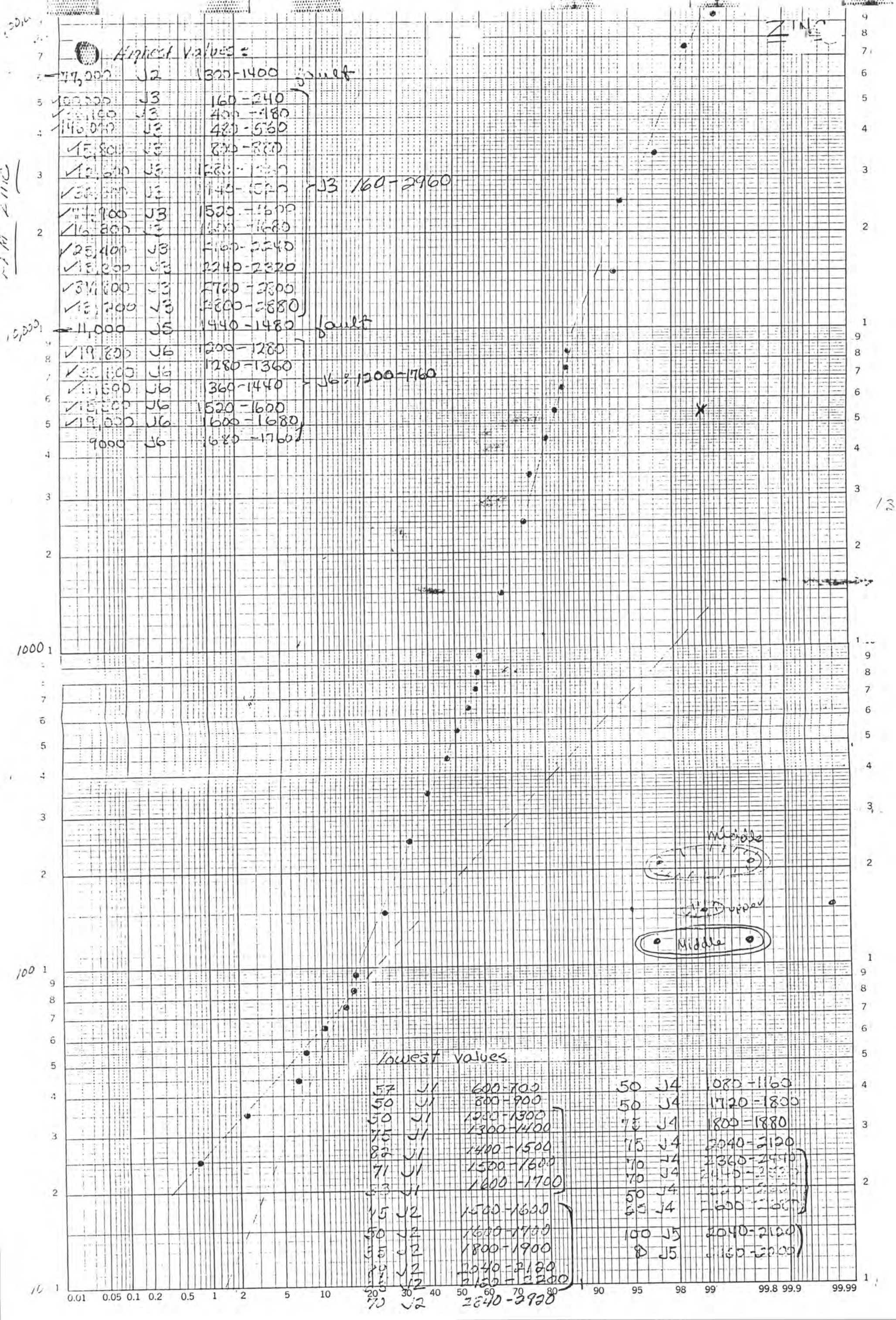
J1	1200-1600
J6	480-720
J5	1440-

High values

>200	J1	15-100
>200	J1	1200-1300
>200	J1	1300-1400
>200	J1	1400-1500
>200	J1	1500-1600
>200	J5	1440-1480
>200	J5	1480-1560
>200	J6	480-560
>200	J6	560-640
>200	J6	640-720
>200	J6	1680-1760
200	J3	2800-2880
170	J3	2880-2960
170	J6	1360-1440

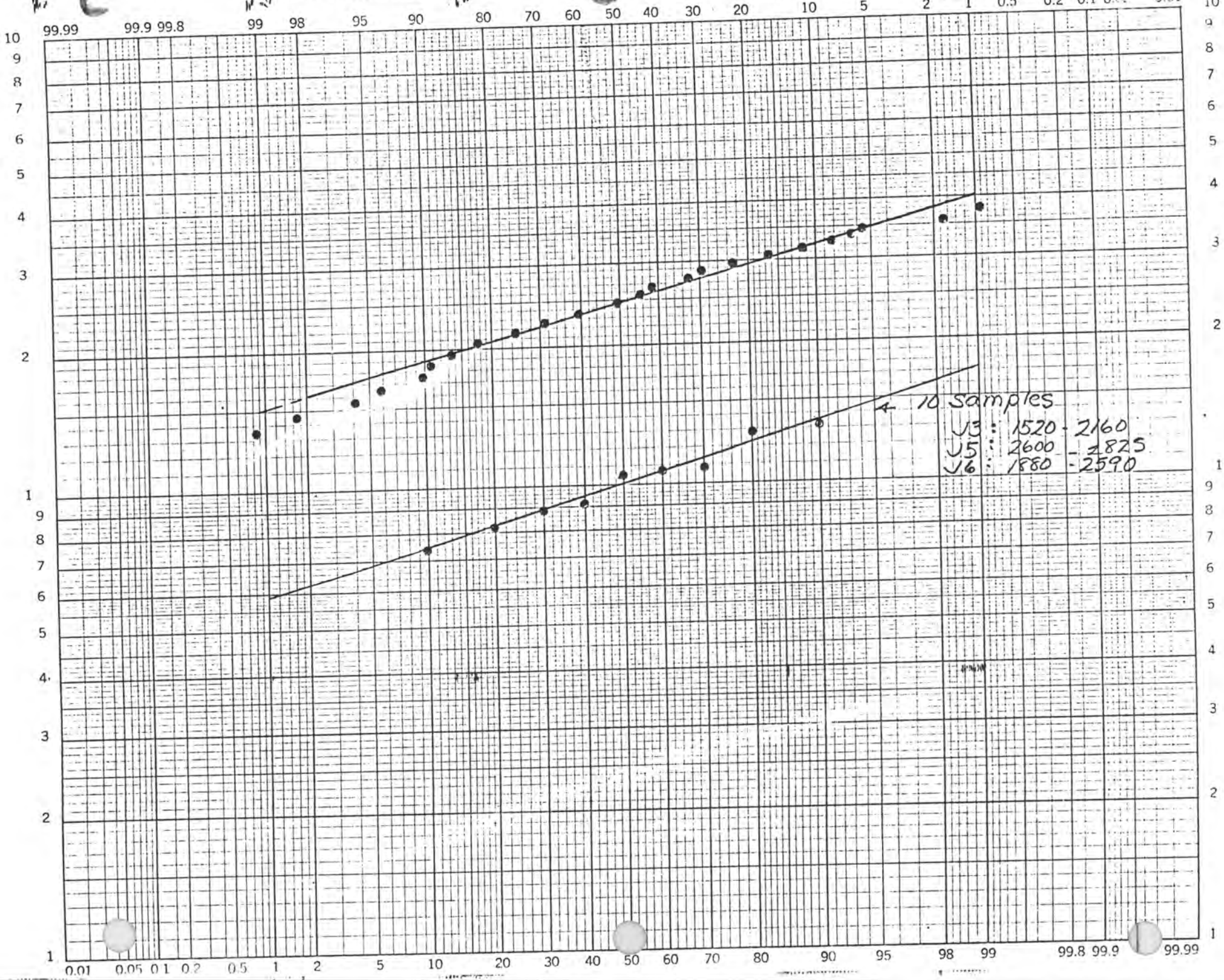
ZINC


PERCENTAGE
5 10 15 20 30 40 50 60 70 80 85 90 95 98%
100,000
10,000
1000
100
10
PPM ZINC
27 samples
J2: 1300-1400 (fault zone)
J3: 160-2960 (Shear zone?)
J4: 3000-3104 (fault zone)
J5: 1440-1560 (fault zone)
J6: 1200-1840 (Shear zone?)
apparent low population
J1: 1200-1700
J2: 1500-2200
J4: 1720-2650


Highest Values:
77,000 J2 1300-1400 fault
100,000 J3 160-240
100,000 J3 400-480
140,000 J3 480-560
15,800 J3 800-880
12,000 J3 1280-1360
30,000 J3 1440-1520
14,100 J3 1520-1600
16,800 J3 1600-1680
25,400 J3 2160-2240
15,800 J3 2240-2320
30,000 J3 2720-2800
15,200 J3 2800-2880
J3 160-2960
11,000 J5 1440-1480 fault
19,800 J6 1200-1280
30,100 J6 1280-1360
11,600 J6 1360-1440
15,200 J6 1520-1600
19,000 J6 1600-1680
9000 J6 1680-1760
J6: 1200-1760
Middle
Middle
Lowest values
57 J1 600-700
50 J1 800-900
50 J1 1200-1300
75 J1 1300-1400
82 J1 1400-1500
71 J1 1500-1600
63 J1 1600-1700
15 J2 1500-1600
50 J2 1600-1700
55 J2 1800-1900
J2 2040-2120
J2 2120-2200
70 J2 2240-2320
50 J4 1080-1160
50 J4 1720-1800
75 J4 1800-1880
75 J4 2040-2120
70 J4 2360-2440
70 J4
50 J4
50 J4
100 J5 2040-2120
8 J5
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99

K·E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

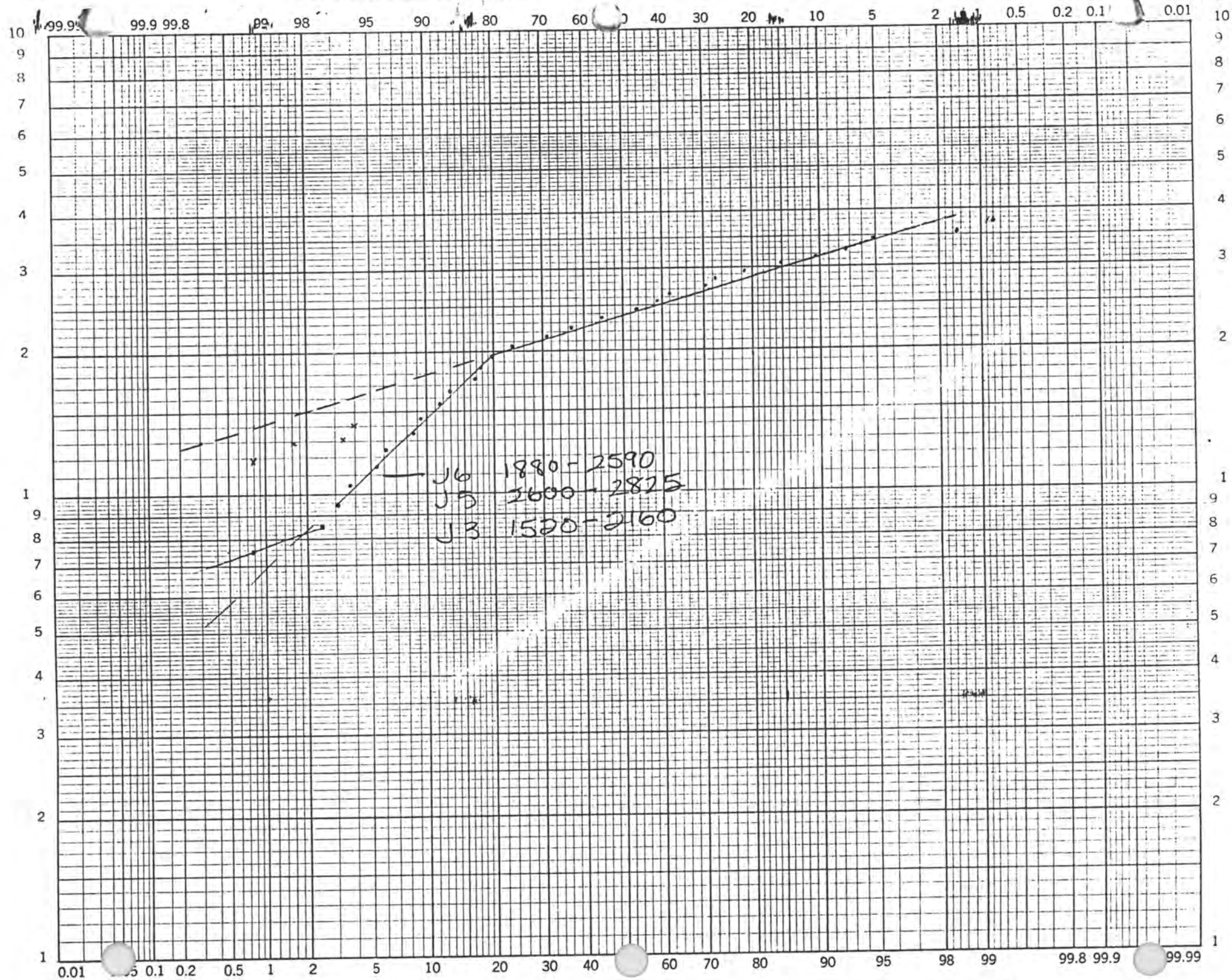
46 8040



K•E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 8040

Le 7.88 (u)



INDUCED POLARIZATION AND

RESISTIVITY SURVEY

KELVIN-JOHNSON PROJECT

SOUTH HALF, SECTION 16; T4S, R13E

PINAL COUNTY, ARIZONA

FOR

CITIES SERVICE MINERALS CORPORATION

PROJECT 0525

mining
geophysical surveys

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SUMMARY	1
SURVEY PROCEDURE	2
INTERPRETATION	3

ACCOMPANYING THIS REPORT:

1 LOCATION MAP
6 GRADIENT ARRAY SKETCH MAPS
1 POLE-DIPOLE EXPANDER
1 SPEC SHEET OF OPERATING PARAMETERS FOR R10A RECEIVER

DISTRIBUTION:

Original & 2 copies: Jack L. Young, Tucson

INDUCED POLARIZATION AND
RESISTIVITY SURVEY
KELVIN-JOHNSON PROJECT
SOUTH HALF, SECTION 16; T4S, R13E
PINAL COUNTY, ARIZONA

FOR

CITIES SERVICE MINERALS CORP.

INTRODUCTION:

During the period of May 16 through 20th, 1975, an induced polarization and resistivity survey was performed on the titled property. The field survey was under the direction of Adam L. Sotelo, technician; the report by W. Gordon Wieduwilt, geophysicist, for Mining Geophysical Surveys.

A gradient electrode array was used for the survey and was laid out by Jack L. Young, geophysicist for Cities, as shown on the accompanying location map. The sketch plan maps of the various data more accurately position the data points within the grid.

SUMMARY:

An increase in the IP response at the NW corner of the half section surveyed suggest that anomalous IP response occurs in and adjacent to that area. A second trend of slightly higher IP response values occurs along the east edge of the area and is a possible continuation of the response zone to the east. The gross IP trend strikes SE trending toward E'ly.

Relatively high resistivity values of 250-600 ohmmeters occur

throughout the area without any strong contrasts. A trend of higher resistivity values of >400 ohmmeters strikes E'ly to NE'ly through the middle of the area from the west. Lower resistivity values of a linear nature surround this trend. There is no apparent correlation between the IP response and resistivity trends as expressed by this survey.

SURVEY PROCEDURE:

The induced polarization and resistivity measurements are made in the time-domain mode of operation. A conventional system of measurements which uses a time cycle of 2.0 seconds "on" and 2.0 seconds "off" - 2.0 seconds "on" and 2.0 seconds "off" (current reversed) was employed. Elliot 10 amp Transmitter used

An Elliot Model R10A receiver was used and measurements were obtained for four channels (windows) and a composite of response with the time characteristics as shown on the attached manufacturer's specification sheet for the receiver used.

The commencement of the measurement of the secondary voltage is delayed by 0.50 seconds to avoid coupling and other transient effects. The integration is performed during the period from 0.50 seconds to 1.70 seconds after the cessation of current.

To conform to a standard presentation, the integral time constant is adjusted to give induced polarization readings equivalent to those obtained with transmitter cycles of 3.0 seconds "on" and 3.0 seconds "off", with integration of the secondary

voltage during the first second of the "off" period.

A gradient electrode array was used with two N-S reference current electrodes placed 10,000' apart, straddling the half section (16) to be surveyed. A 500' potential dipole was used for the survey and occupied stations at 500' intervals along N-S profiles. The line interval was set at 500' as well. All data is plotted to the midpoint of the potential dipole. In addition to the gradient array, one pole-dipole test expander was surveyed from Line 3, 15N, using a 500' dipole. The data from the expander is presented on a log-log plot.

Apparent polarization response is in units of millivolt-seconds-per-volt, or milliseconds (ms), and apparent resistivity is in units of ohmmeters. The data for the composite IP response, the apparent resistivity, and each of the four channels of IP data is presented in plan.

INTERPRETATION:

The potential distribution from a gradient array survey can be compared to the horizontal component of the Earth's magnetic field for interpretation purposes. However, a rigorous interpretation of electrical disturbances using this approach is of doubtful significance. The gradient array, we feel, is best used as a reconnaissance method where an indication of a contrast in IP response and resistivity is the basis for additional studies using electrode configurations capable of producing data suitable

to a more quantitative interpretation.

The four channels of IP data as recorded here may be helpful in analysing noise and EM coupling characteristics. Their value as a method of separating "type response" materials cannot be ruled out, but has yet to be demonstrated to date.

IP RESPONSE DATA

The composite and each of the four channels of IP response have produced essentially identical patterns. We, therefore, feel that a discussion of the composite data suffices to explain the characteristics seen on all channels.

IP response values increase to the north in the west half of the area, increase to the north in the east central portion, and increase to the north in the east half, but tend to decrease again at the northeast corner of the area. The resultant picture is one of an elongated anomalous zone striking SE'ly to E'ly, with the largest portion of the zone occurring to the northwest, adjacent to the survey area. A test expander was surveyed from Line 3, 15N to the west and indicates IP response of 18-20 ms influences the stations throughout that cross line and to a depth of 1000'+. These values are in keeping with the gradient results. Additional expander tests to analyse the higher response areas to the north might be fruitful towards understanding the source of the anomalous response.

RESISTIVITY DATA

An irregularly-shaped high resistivity trend of 400-600

ohmmeters strikes E to NE'ly from the southwest corner of section 16. This high resistivity trend appears interrupted, but may continue to the NE as evidenced by the high resistivity values in the NE corner of the area. A somewhat linear characteristic is expressed in the low resistivity material where resistivities of 250 ohmmeters trend E to NE'ly adjacent to the high resistivity zone. The resistivity boundaries are not sharply defined as a very small contrast in resistivity occurs throughout the area. The test expander indicates a resistivity of 300 ohmmeters for a distance of 1500' ± 250' west of C_1, where a near-surface contact is crossed. The resistivity locally west of the contact is estimated at about 600 ohmmeters. Lower resistivity values occur at depth or adjacent to the expander profile, influencing the apparent resistivity at the larger separations.

Respectfully submitted,

W. Gordon Wieduwilt
Geophysicist

Registered Professional Engineer (Geophysical)
CERTIFICATE NO.
8842
W. GORDON
WIEDUWILT
DATE SIGNED 6/3/75
Arizona U. S. A.

May 2, 1975

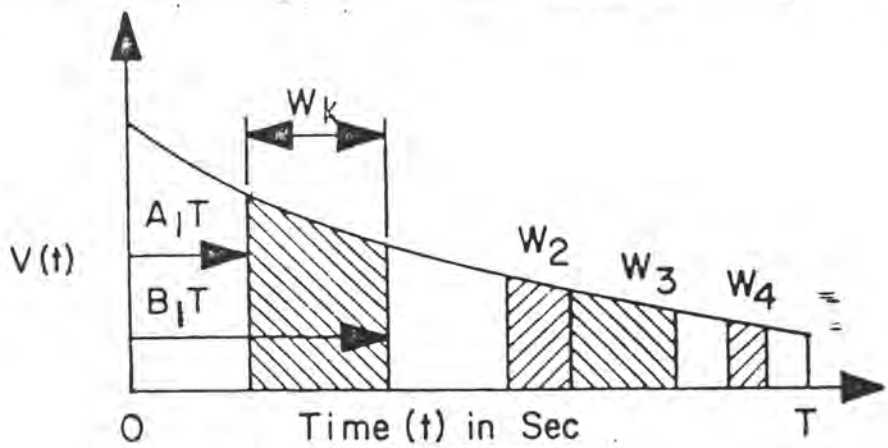
Tucson, Arizona

SPECIFIC OPERATING PARAMETERS

ELLIOT MODEL R10A RECEIVER

DATE 2/13/75

UNIT	S/N
Main frame R-10A	1003
Analog PC-159	114
Integrator PC-160	111
Digital PC-155	111
Cal/Scaler PC-161	111



A_kT = Time to Start of kth Integration Window (sec)

B_kT = Time to End of kth Integration Window (sec)

W_k = $(B_kT - A_kT)$ = Width of kth Integration Window (sec)

C_k = Instrument Readout of Chargeability in M331 Units (millisec) as Defined by Newmont Exploration Ltd.

RC_k = Integrator Time Constant (sec)

G_k = Output Amplifier Scaler Gain

$$V_k = \frac{(C_k)(RC_k)}{(W_k)(G_k)} = \text{Average Decay Voltage During } k^{th} \text{ Window } \left(\frac{mV}{V}\right)$$

T = 2.0 Seconds (¼ of Waveform Period)

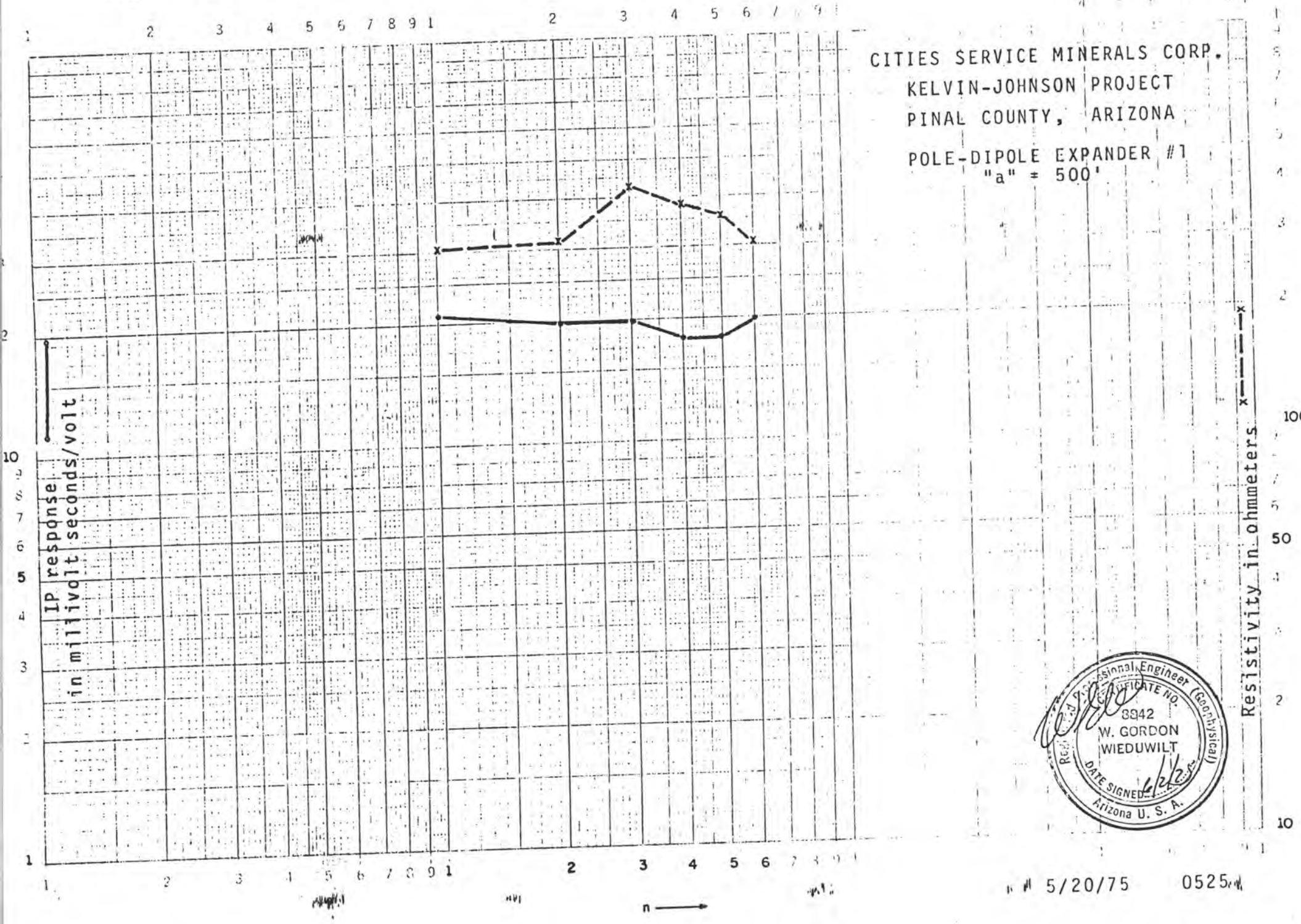
SP Offset Correction Performed at 1.90 Seconds.

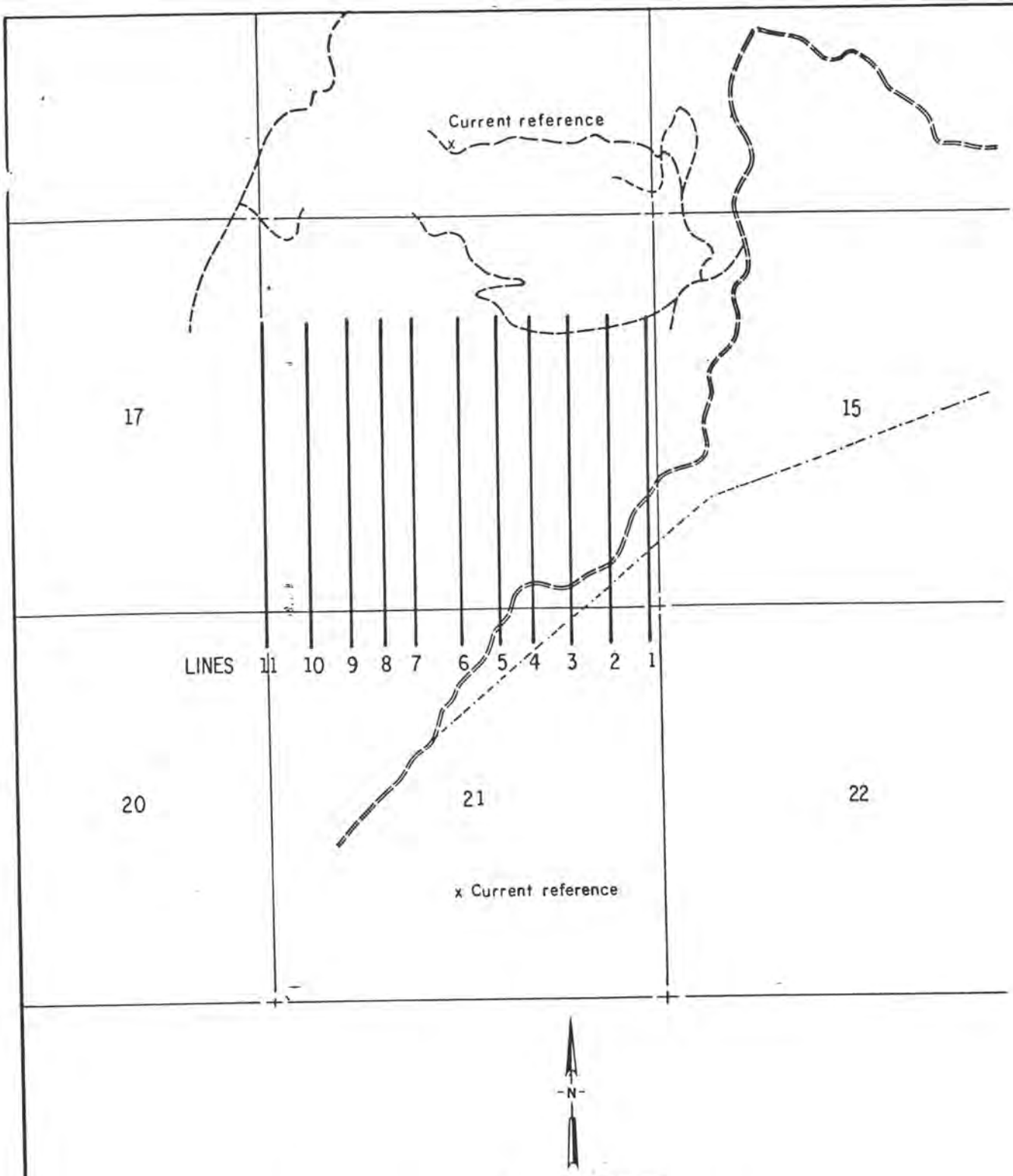
Powerline Rejection Frequency = 60 Hertz.

Window No. k	A_kT (sec)	B_kT (sec)	W_k (sec)	RC_k (sec)	G_k	CAL C_k (ms)
1	0.50	0.80	0.30	0.075	0.29	24
2	0.80	1.10	0.30	0.075	0.34	27
3	1.10	1.40	0.30	0.075	0.39	32
4	1.40	1.70	0.30	0.075	0.43	35
Composite	0.50	1.70	1.20	0.075	0.091	30

K&E LOGARITHMIC • 1 X 3 CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 7320





SCALE 1:24000

I.P. and RESISTIVITY SURVEY

LOCATION MAP

KELVIN JOHNSON PROJECT

PINAL COUNTY, ARIZONA

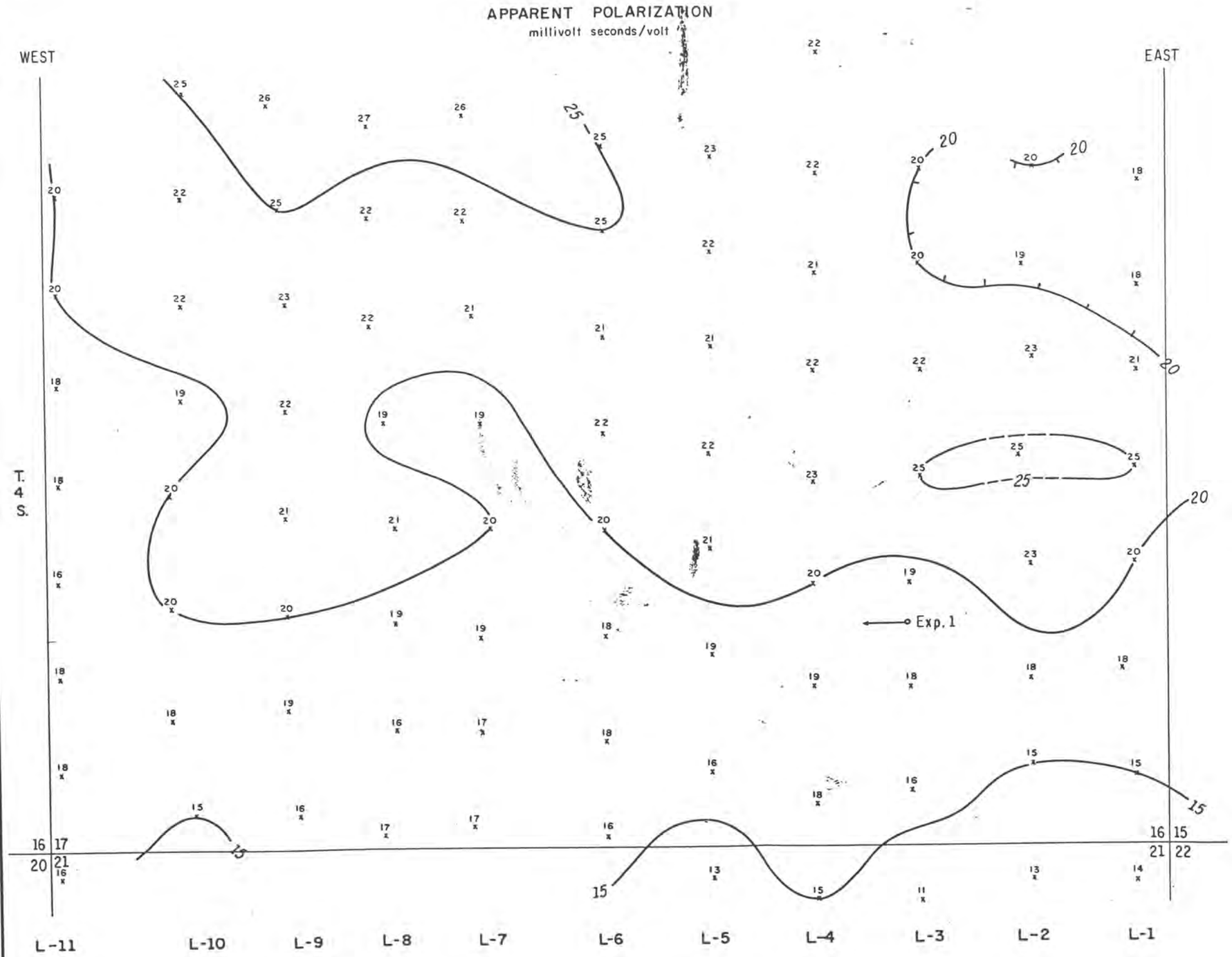
for

CITIES SERVICE MINERALS CORP.

by

mining
geophysical surveys

0525

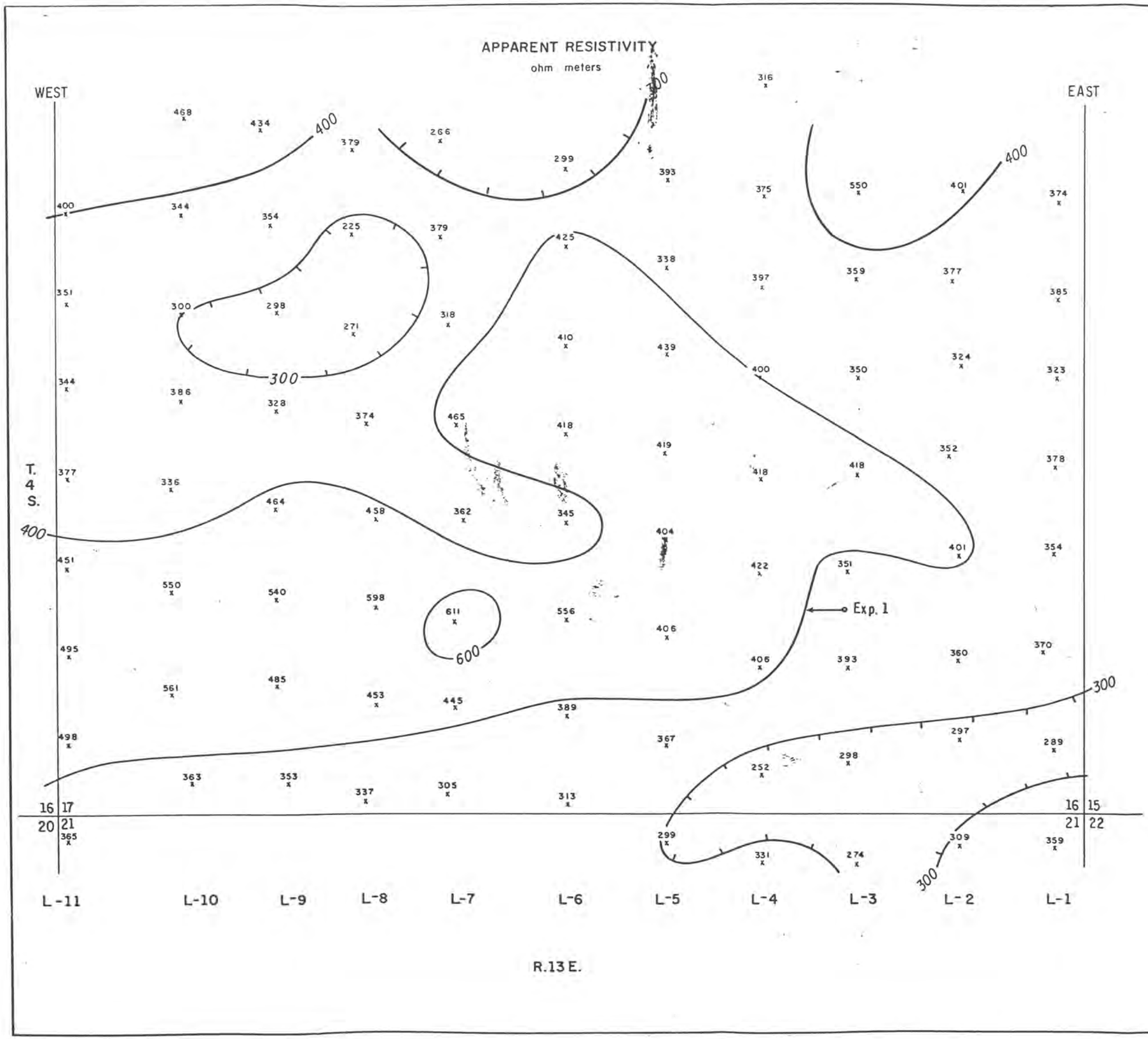


CONTOUR MAP OF COMPOSITE I.P. RESPONSE

SHEET 1 OF 6

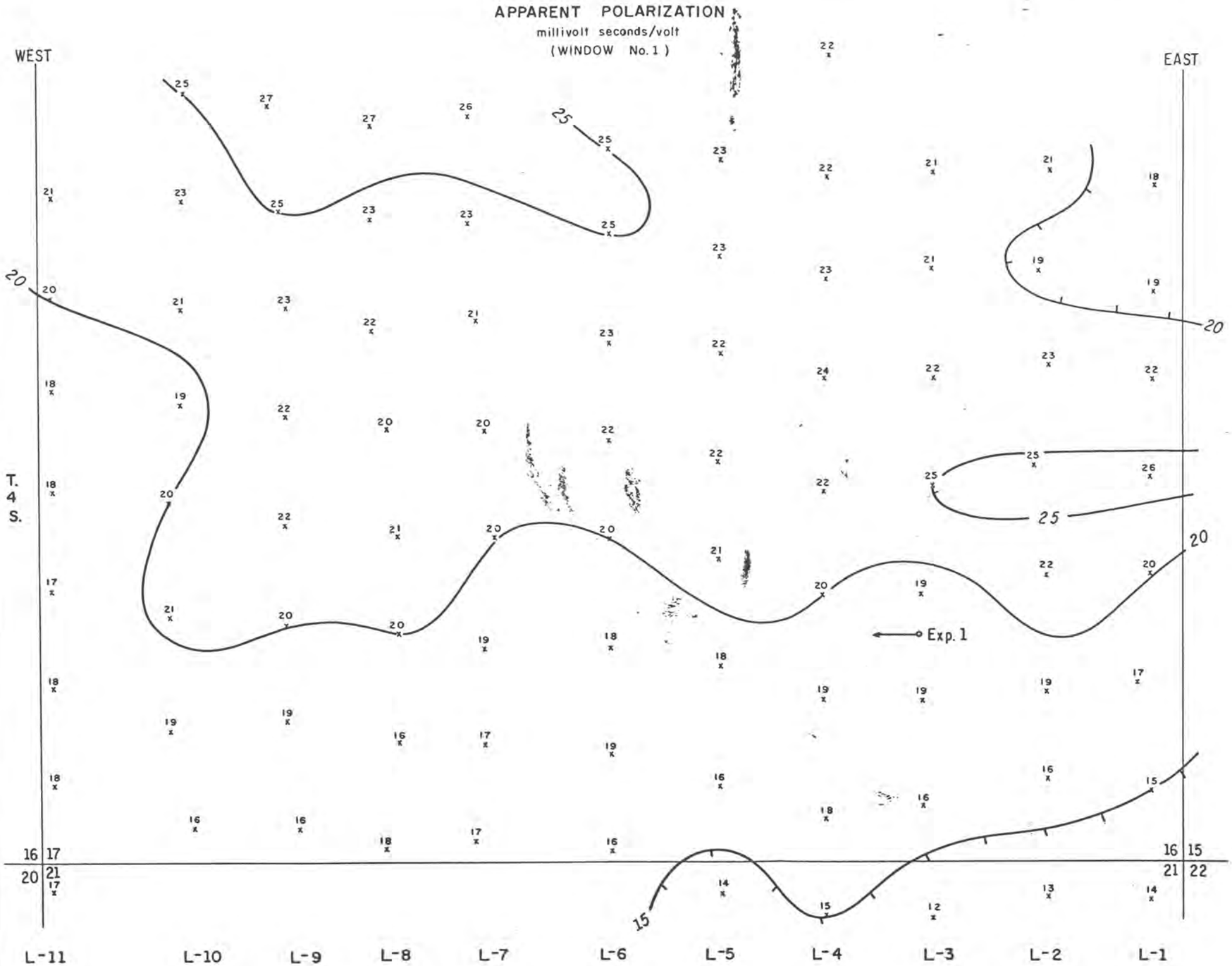
SCALE 1" = 500'

I.P. and RESISTIVITY SURVEY
SKETCH MAP
KELVIN JOHNSON PROJECT
PINAL COUNTY, ARIZONA
for
CITIES SERVICE MINERALS CO
by
mining geophysical surveys



SHEET 2 OF 6

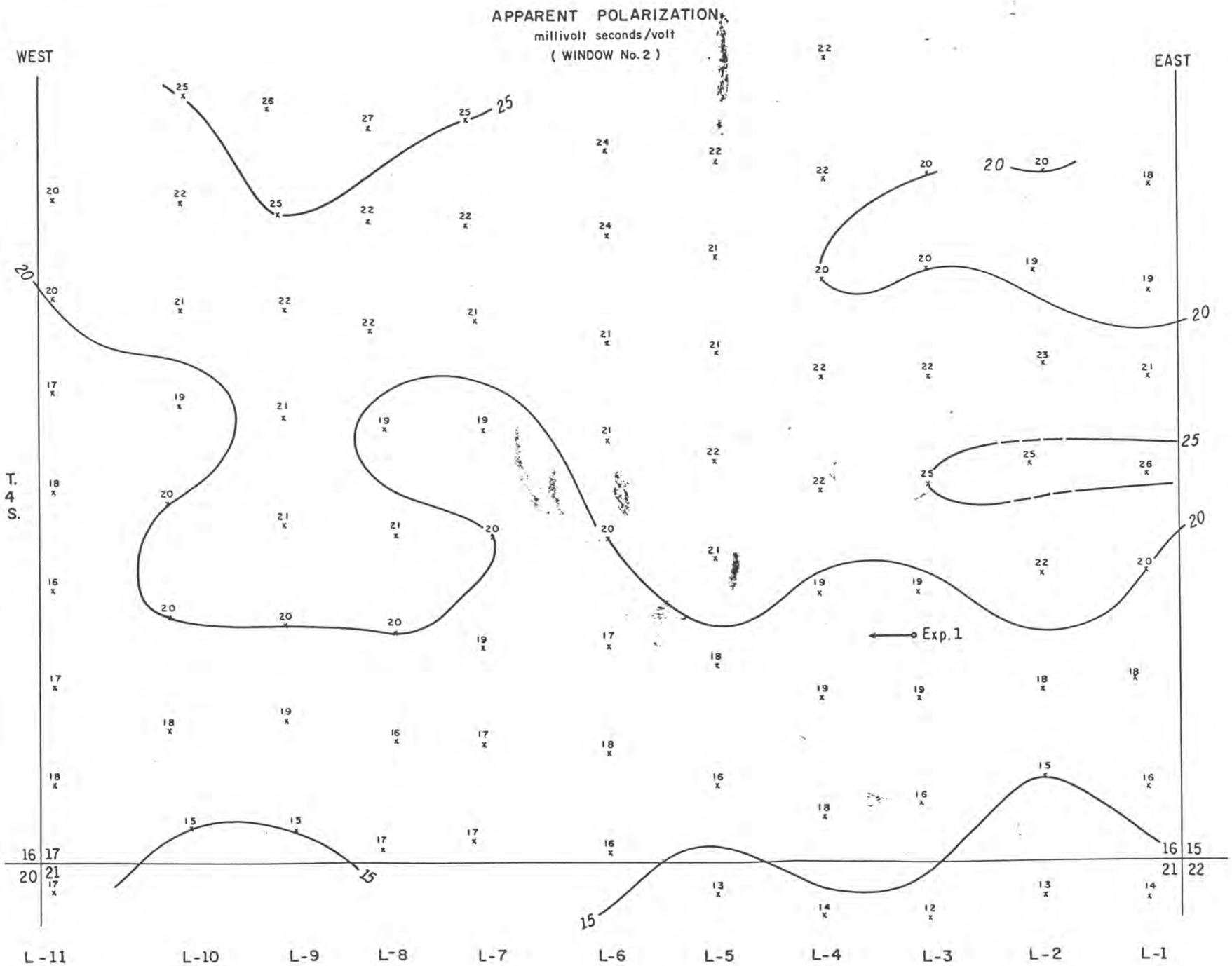
CONTOUR MAP OF APPARENT RESISTIVITIE



SHEET 3 OF 6

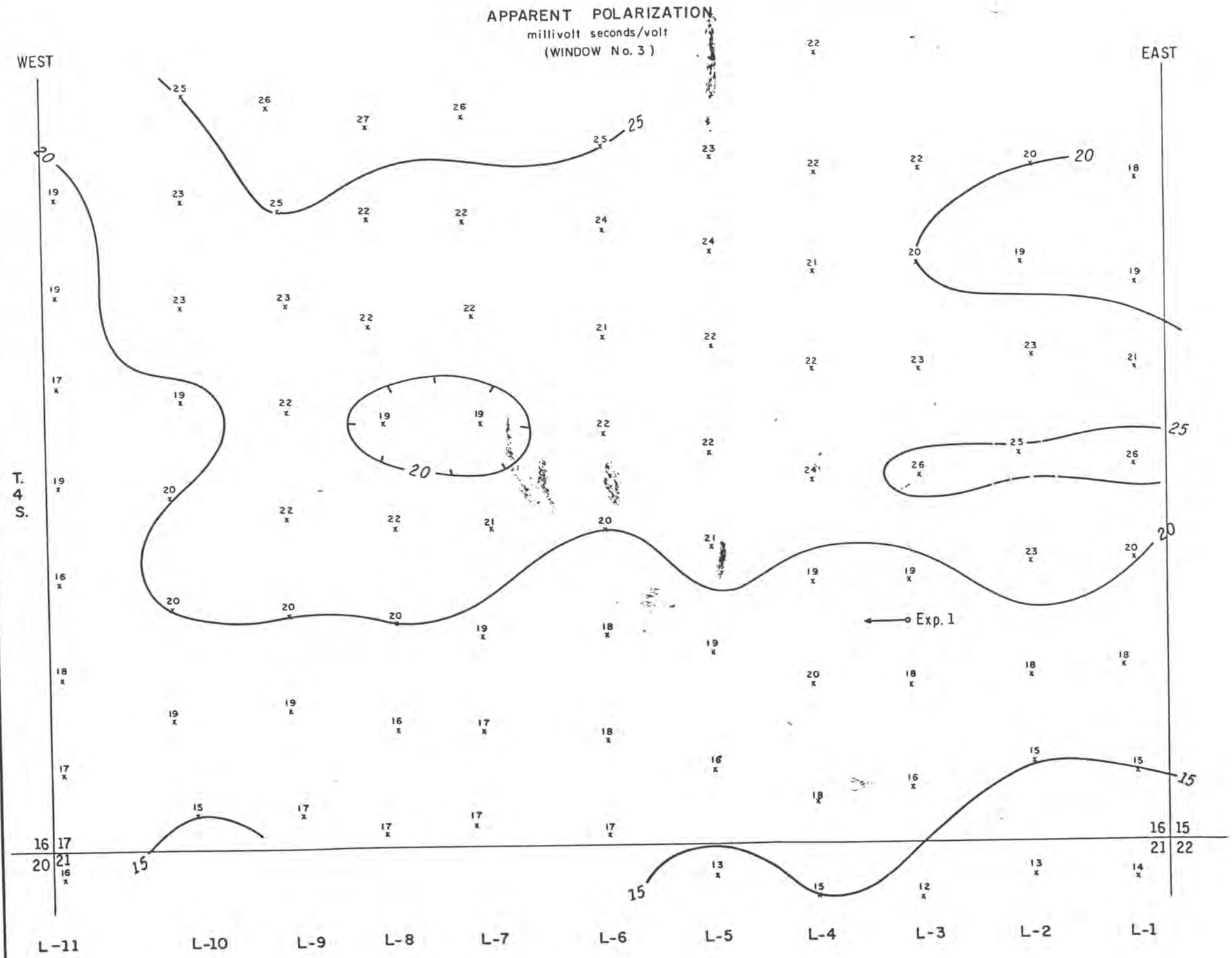
R.13 E.

CONTOUR MAP OF APPARENT I.P. RESPONSE
CHANNEL 1



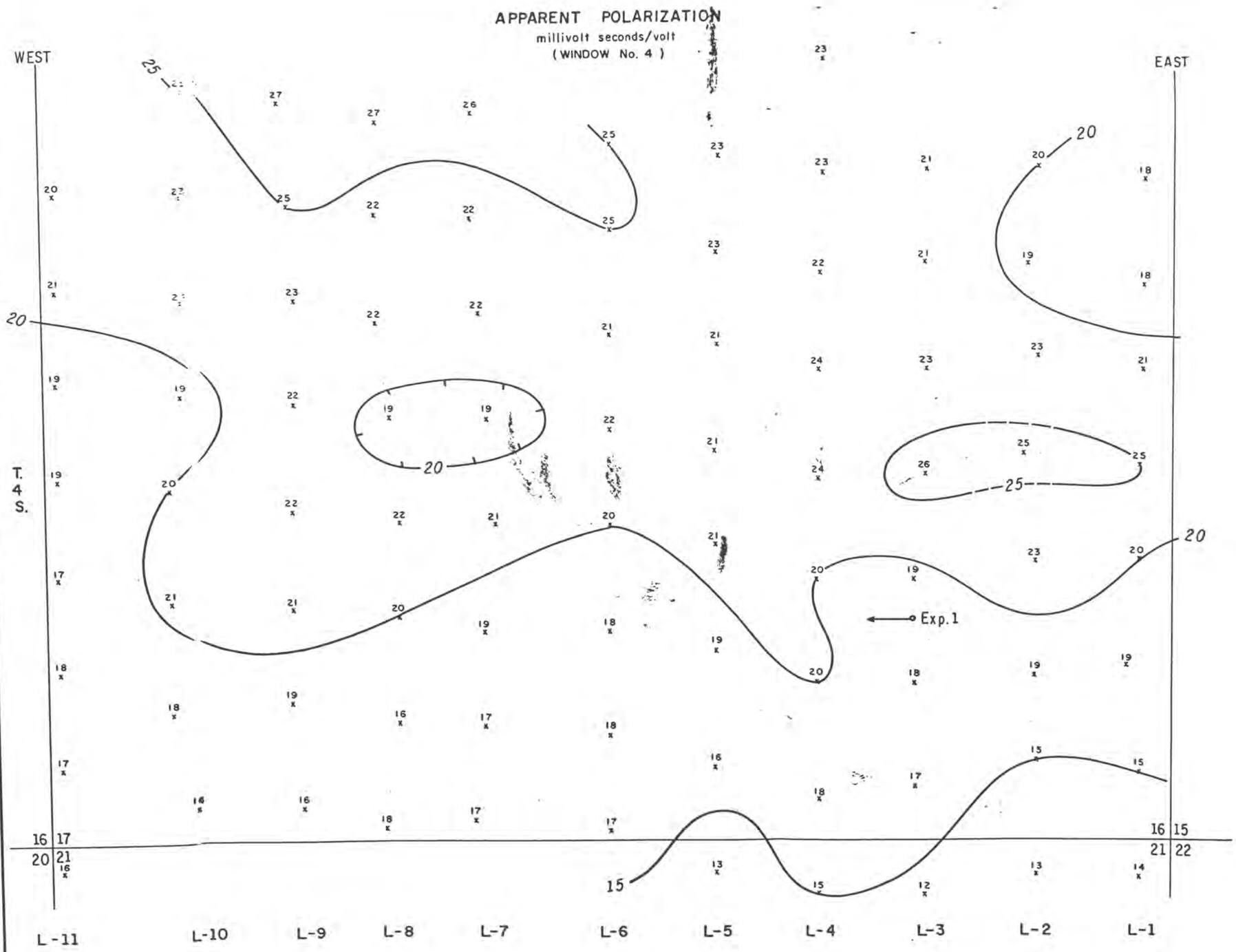
SHEET 4 OF 6

CONTOUR MAP OF APPARENT I.P. RESPONSE
CHANNEL 2



SHEET 5 OF 6

CONTOUR MAP OF APPARENT I.P. RESPONSE
CHANNEL 3



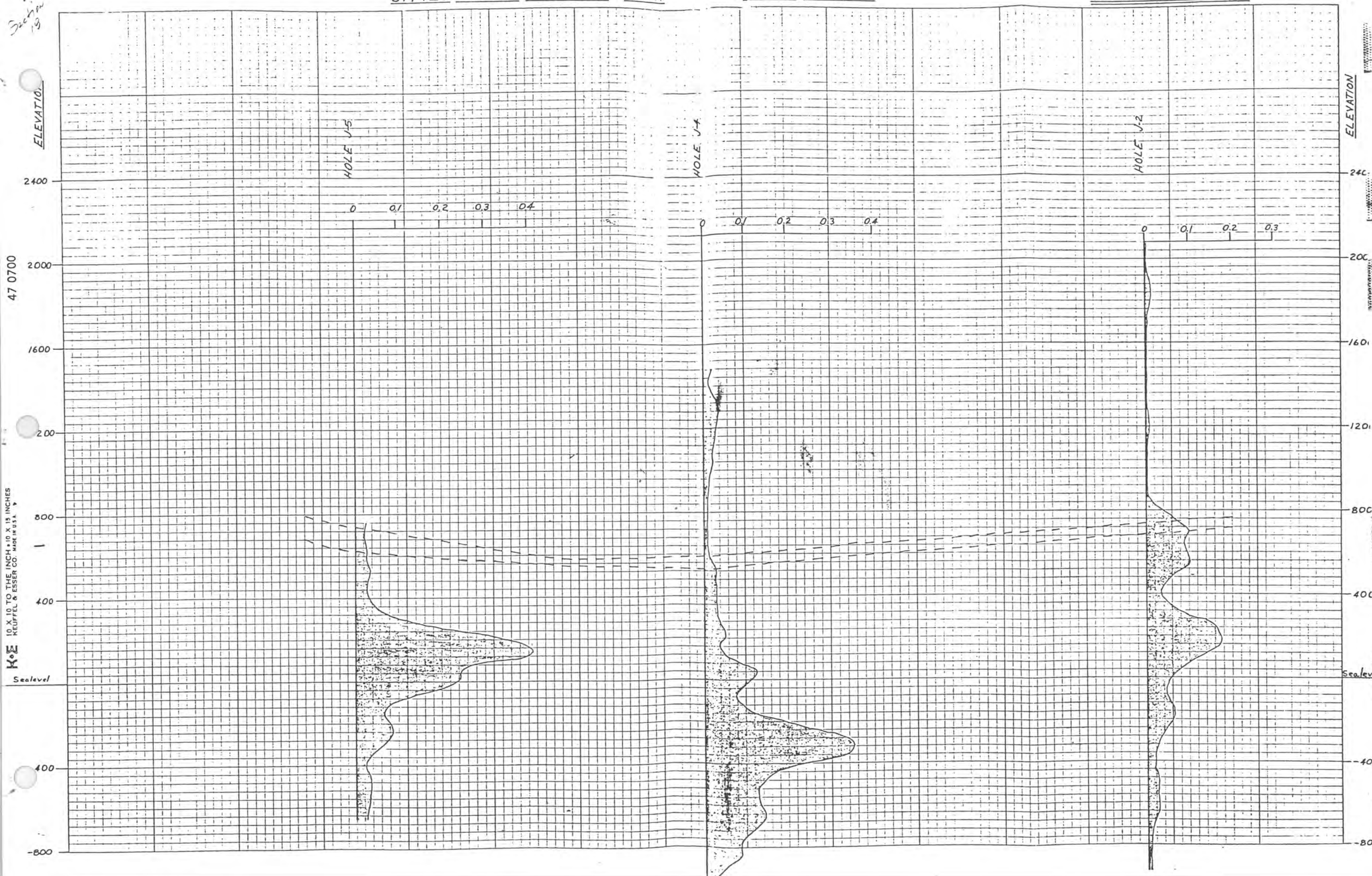
SHEET 6 OF 6

R.13 E.

CONTOUR MAP OF APPARENT I.P. RESPONSE
CHANNEL 4

CITIES SERVICE MINERALS CORP. KELVIN PROJECT COPPER (PERCENT)

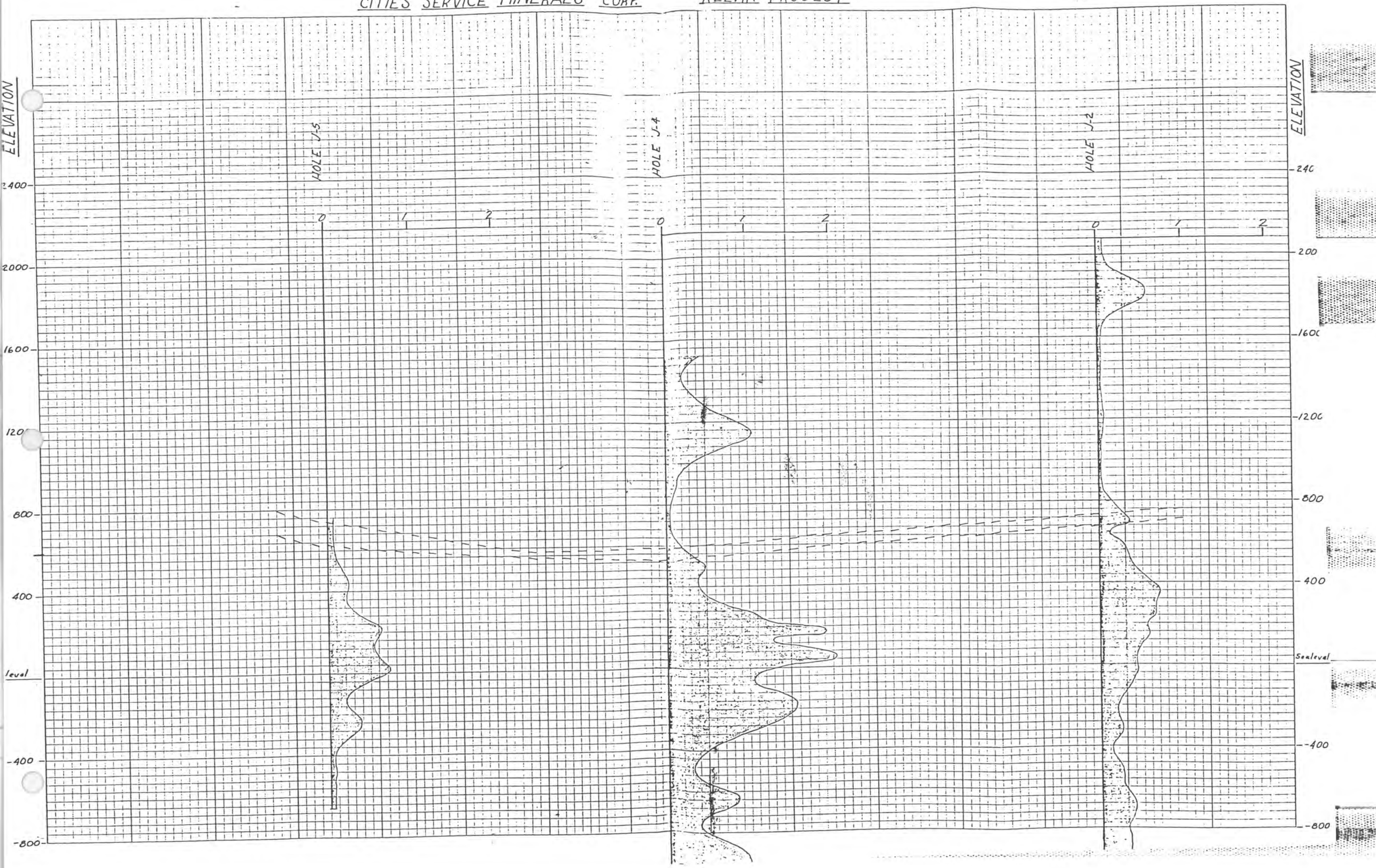
Section 13



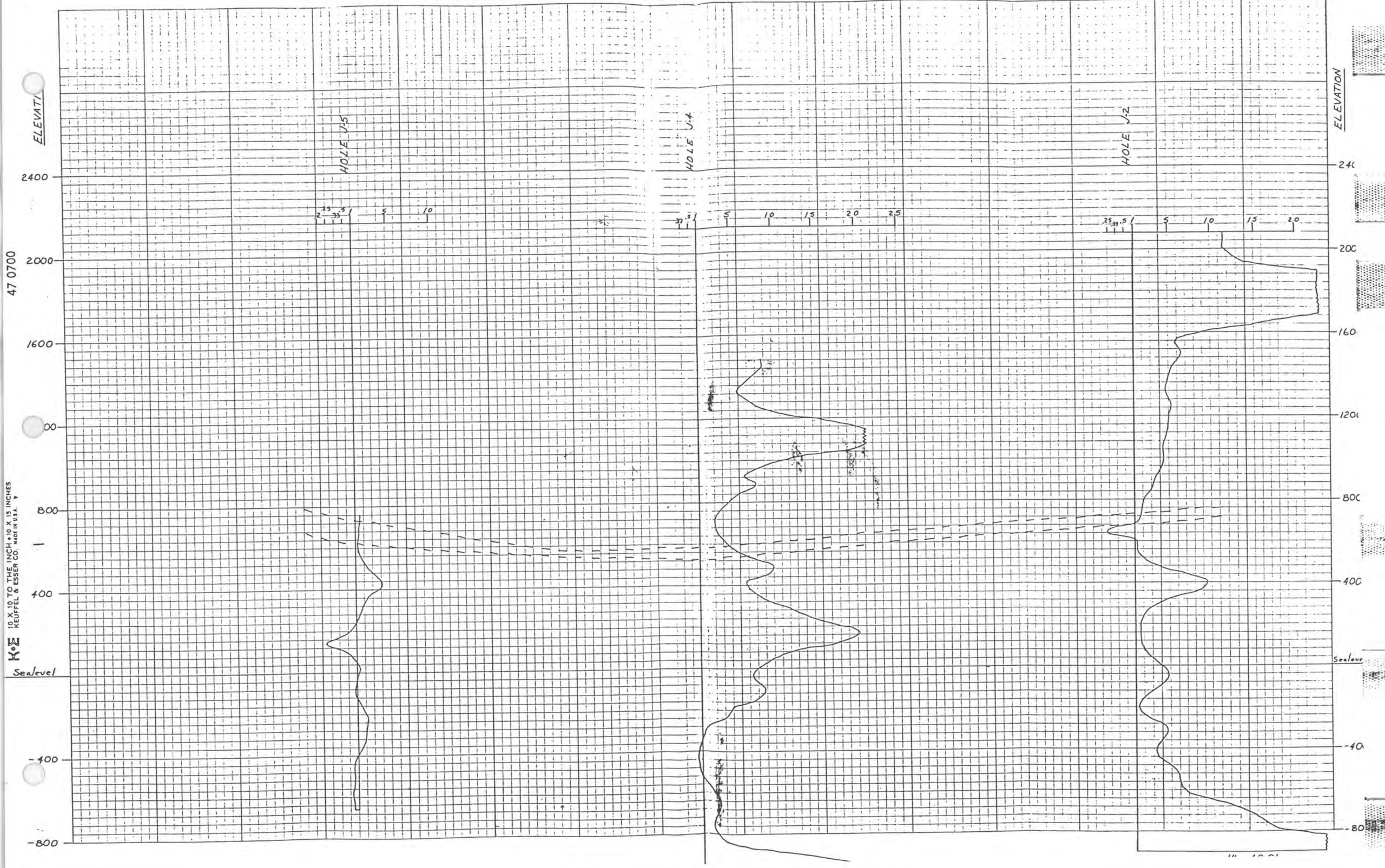
CITIES SERVICE MINERALS CORP. ALVIN PROJECT MOLYBDENUM (PPM)

47 0700
KEUFFEL & ESSER CO. MADE IN U.S.A.

CITIES SERVICE MINERALS CORP. KELVIN PROJECT

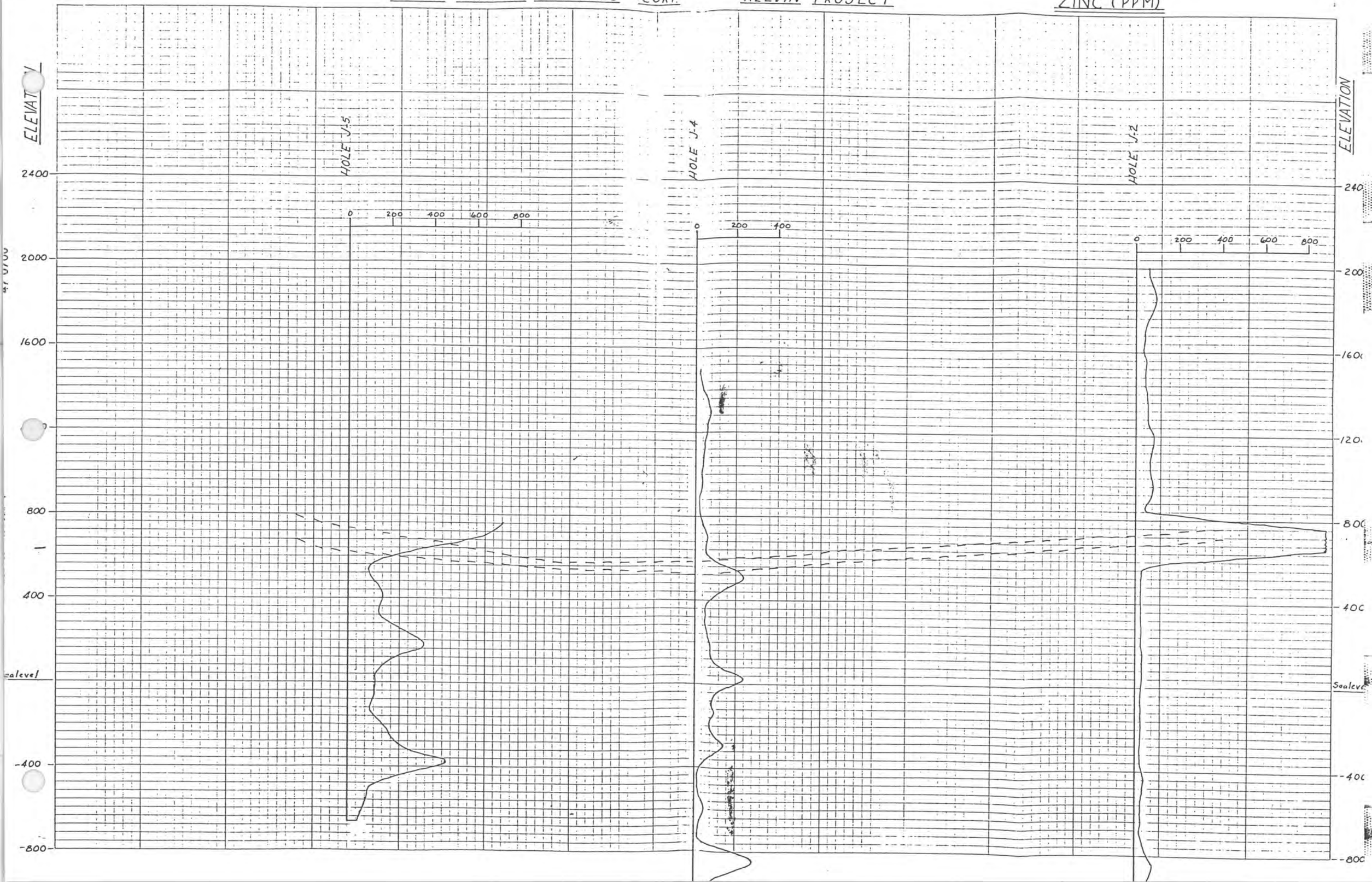

ELEVATION
2400
2000
1600
1200
800
400
level
-400
-800
HOLE J-5
HOLE J-4
HOLE J-2
0
1
2
ELEVATION
240
200
160
120
80
40
Sealevel
-40
-80

CITIES SERVICE MINERALS CORP. KELVIN PROJECT PYRITE ÷ CHALCOPYRITE

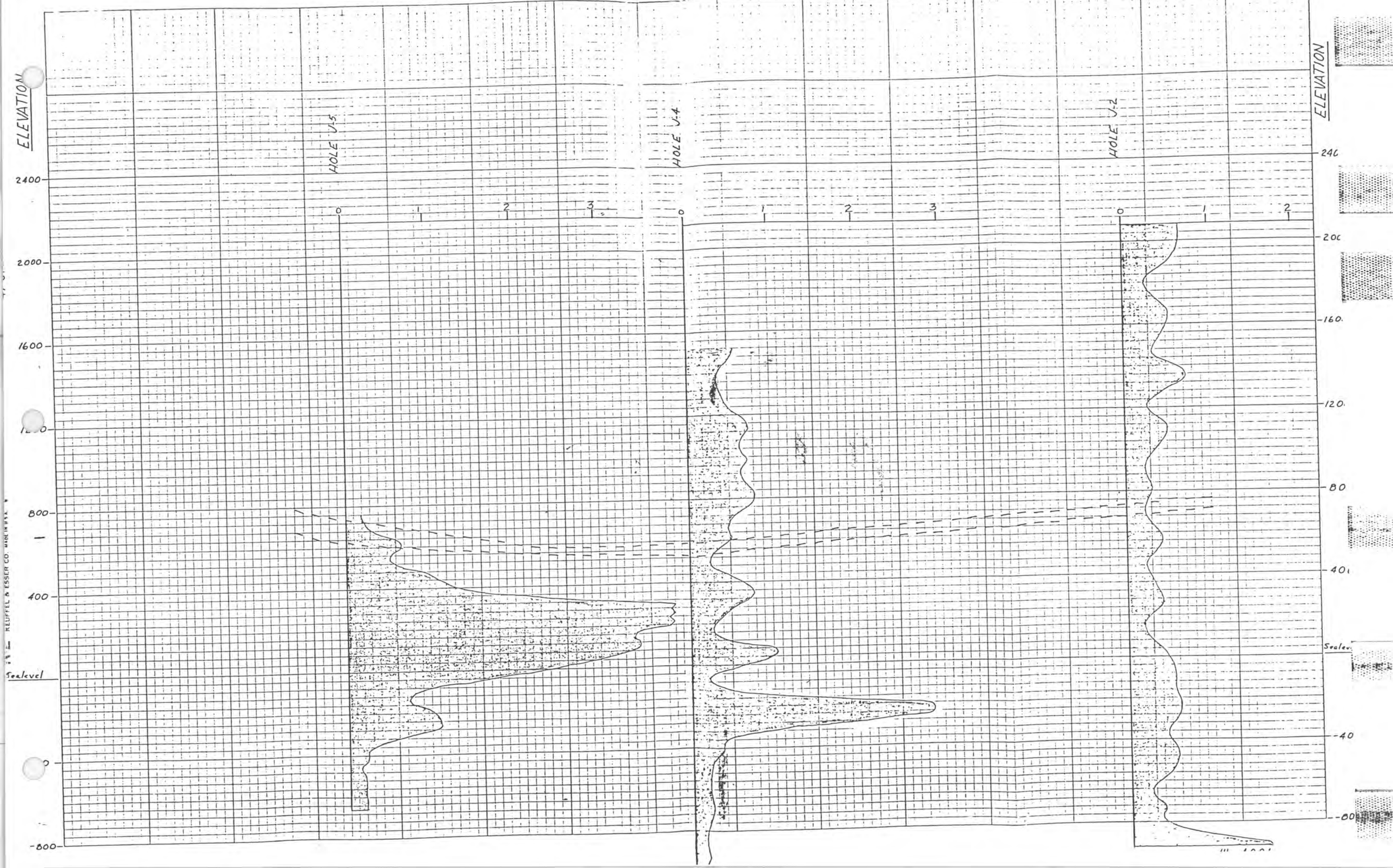


CITIES SERVICE MINERALS CORP. KELVIN PROJECT

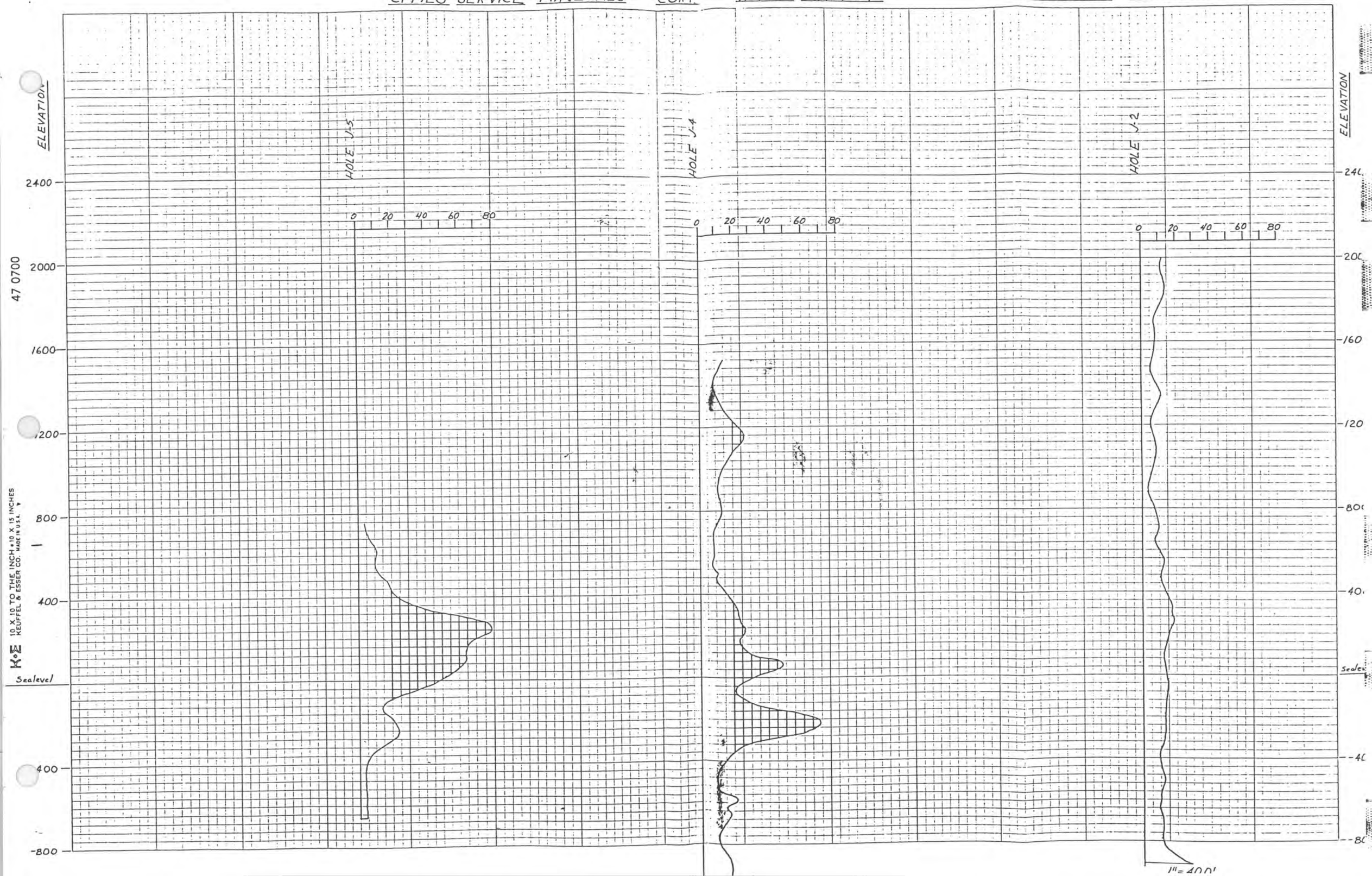
ZINC (PPM)



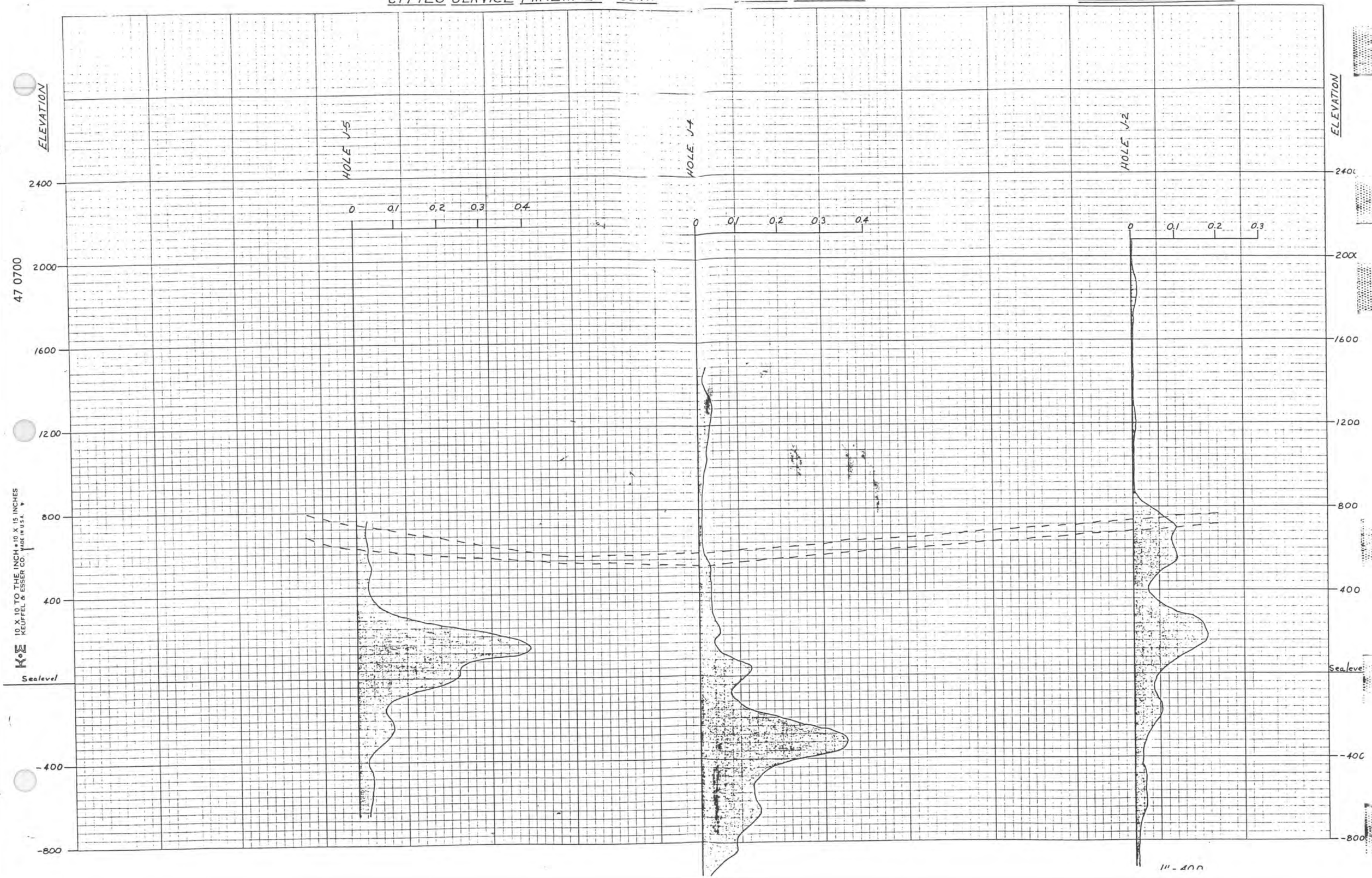
CITIES SERVICE MINERALS CORP. KELVIN PROJECT VOL. % MAGNETITE



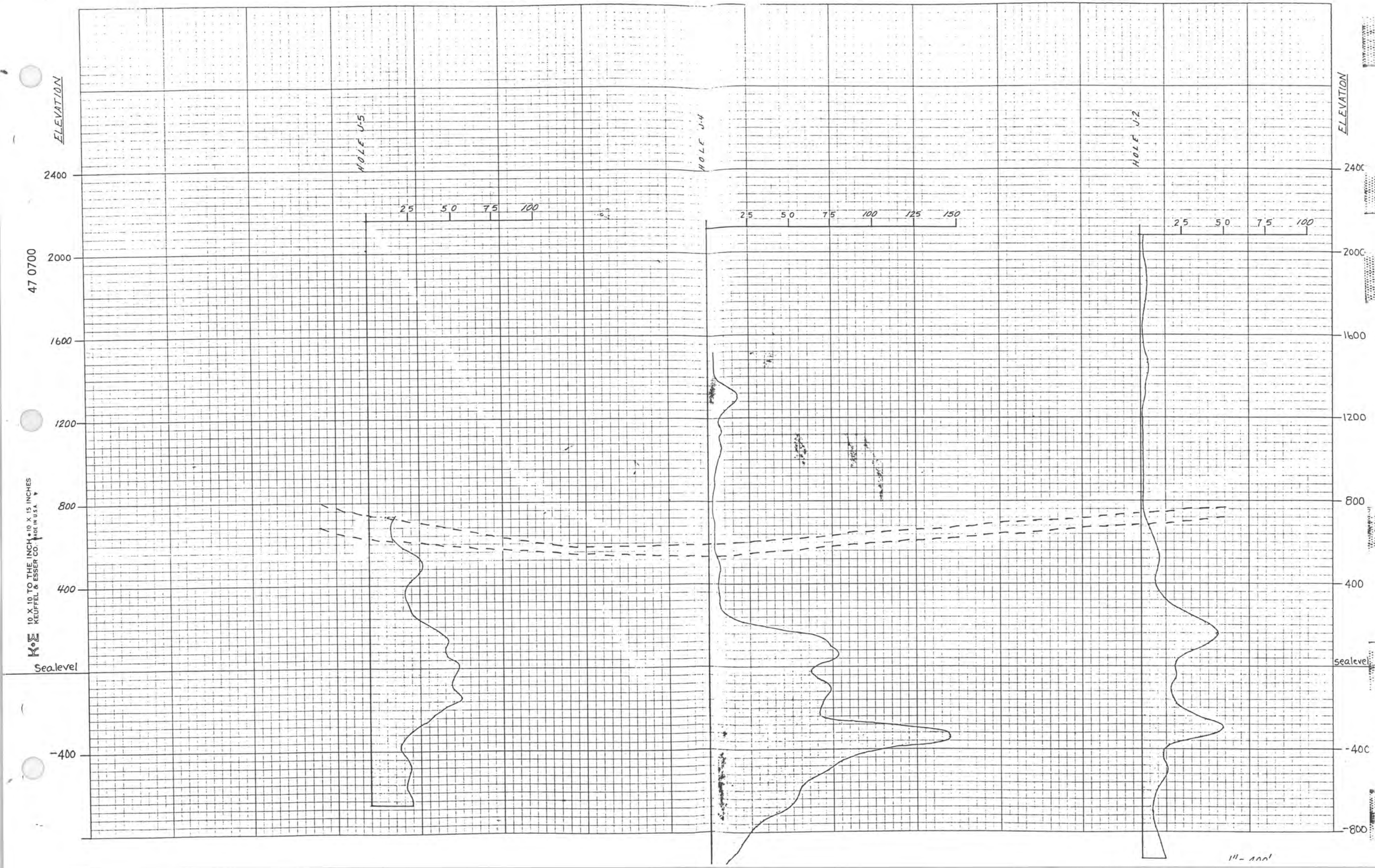
CITIES SERVICE MINERALS CORP. KELVIN PROJECT CALCULATED CHARGEABILITY (Mc)



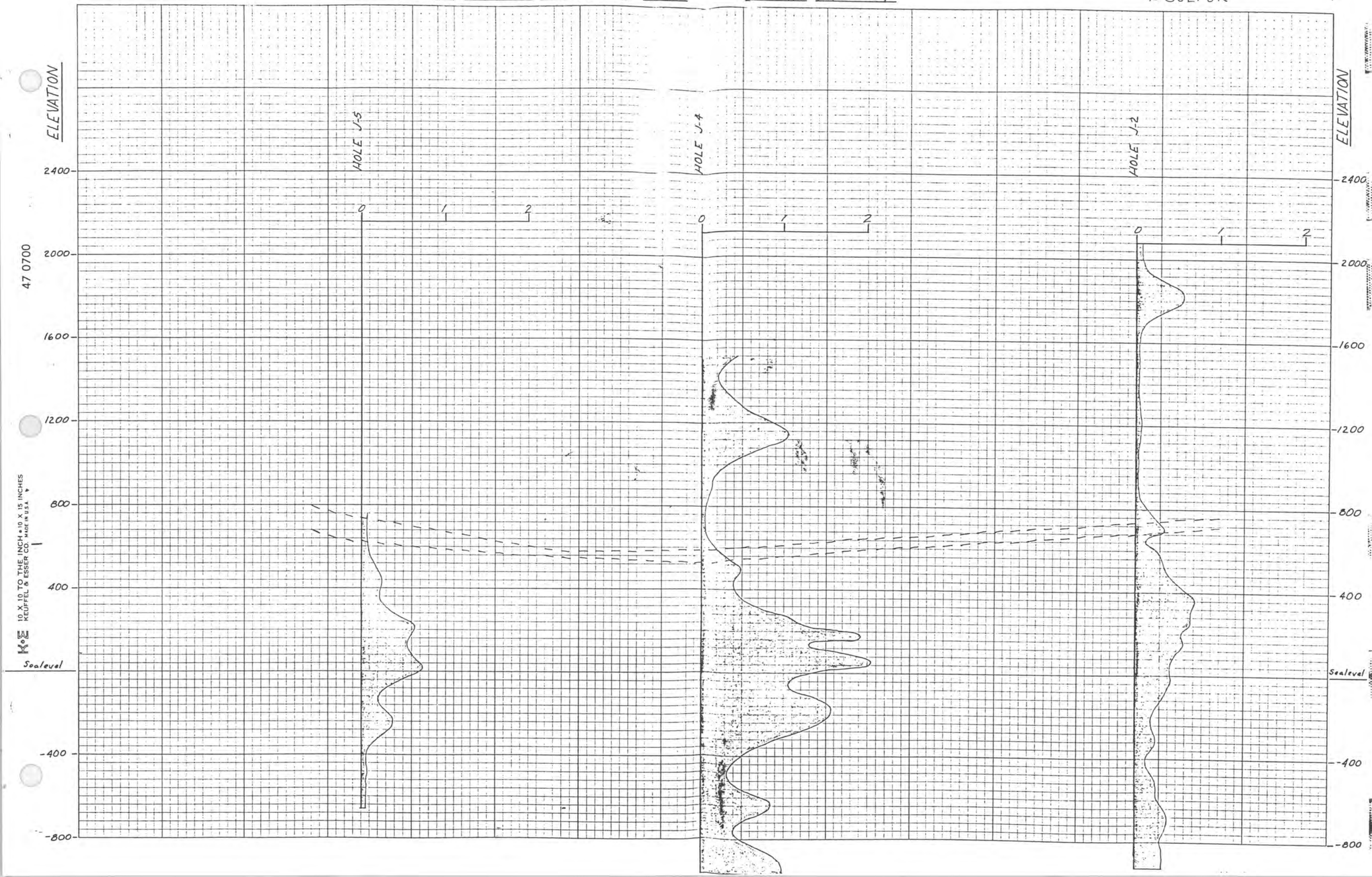
CITIES SERVICE MINERALS CORP — KELVIN PROJECT — COPPER (PERCENT)



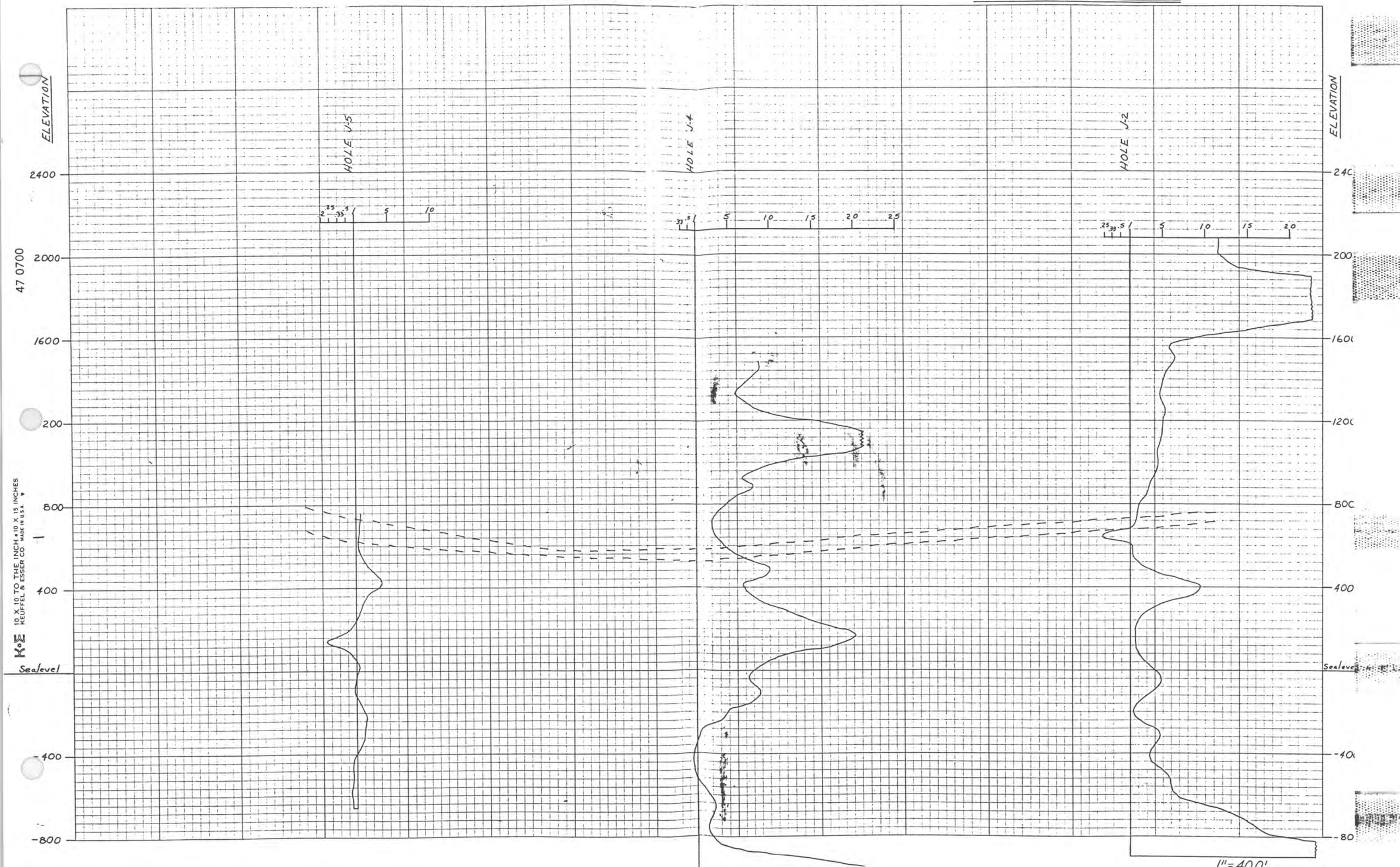
CITIES SERVICE MINERALS CORP. ALVIN PROJECT MOLYBDENUM (PPM)



CITIES SERVICE MINERALS CORP. KELVIN PROJECT



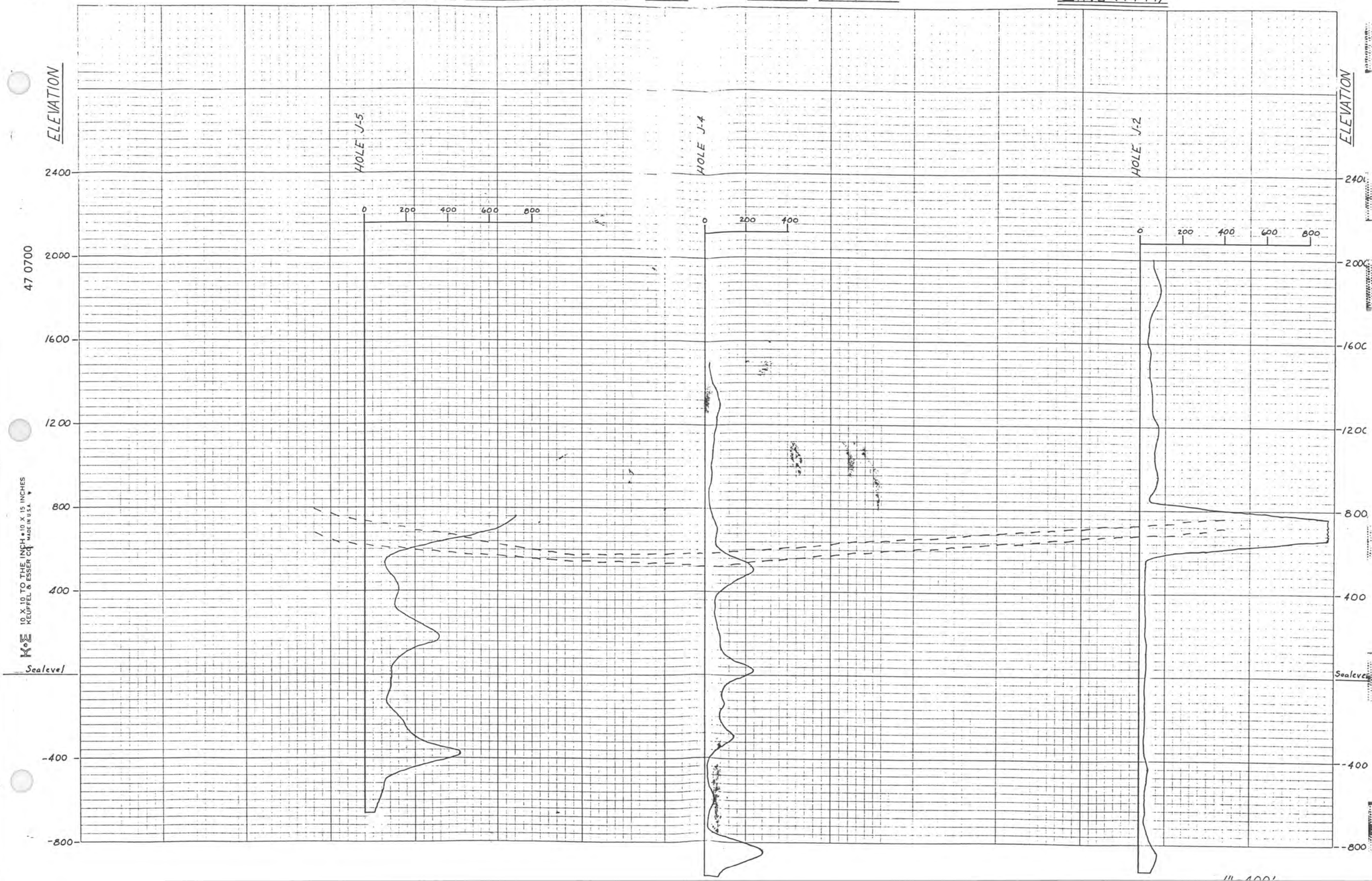
CITIES SERVICE MINERALS CORP. KELVIN PROJECT PYRITE ÷ CHALCOPYRITE



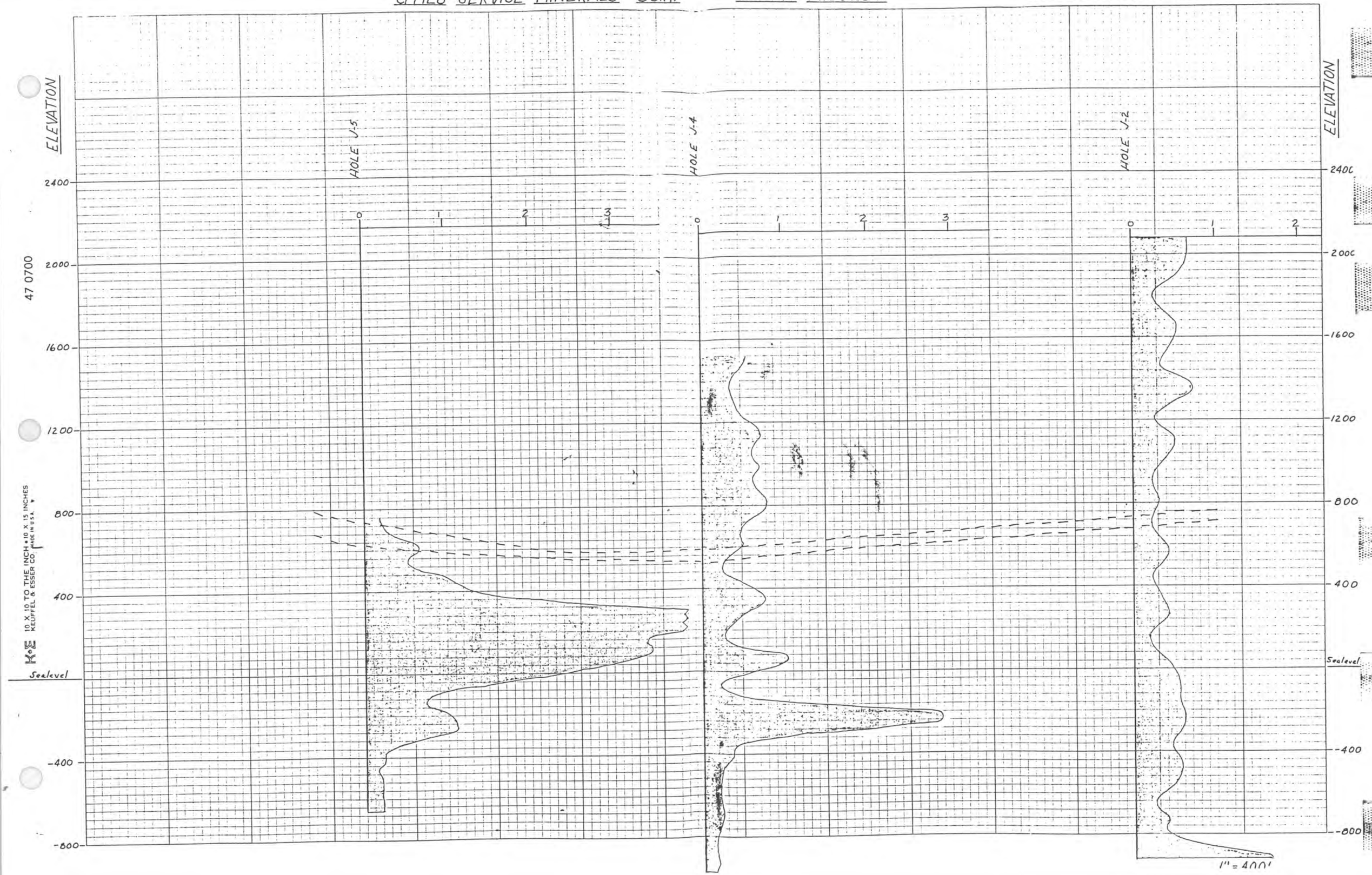
47 0700

K+E 10 X 10 TO THE INCH • 10 X 15 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

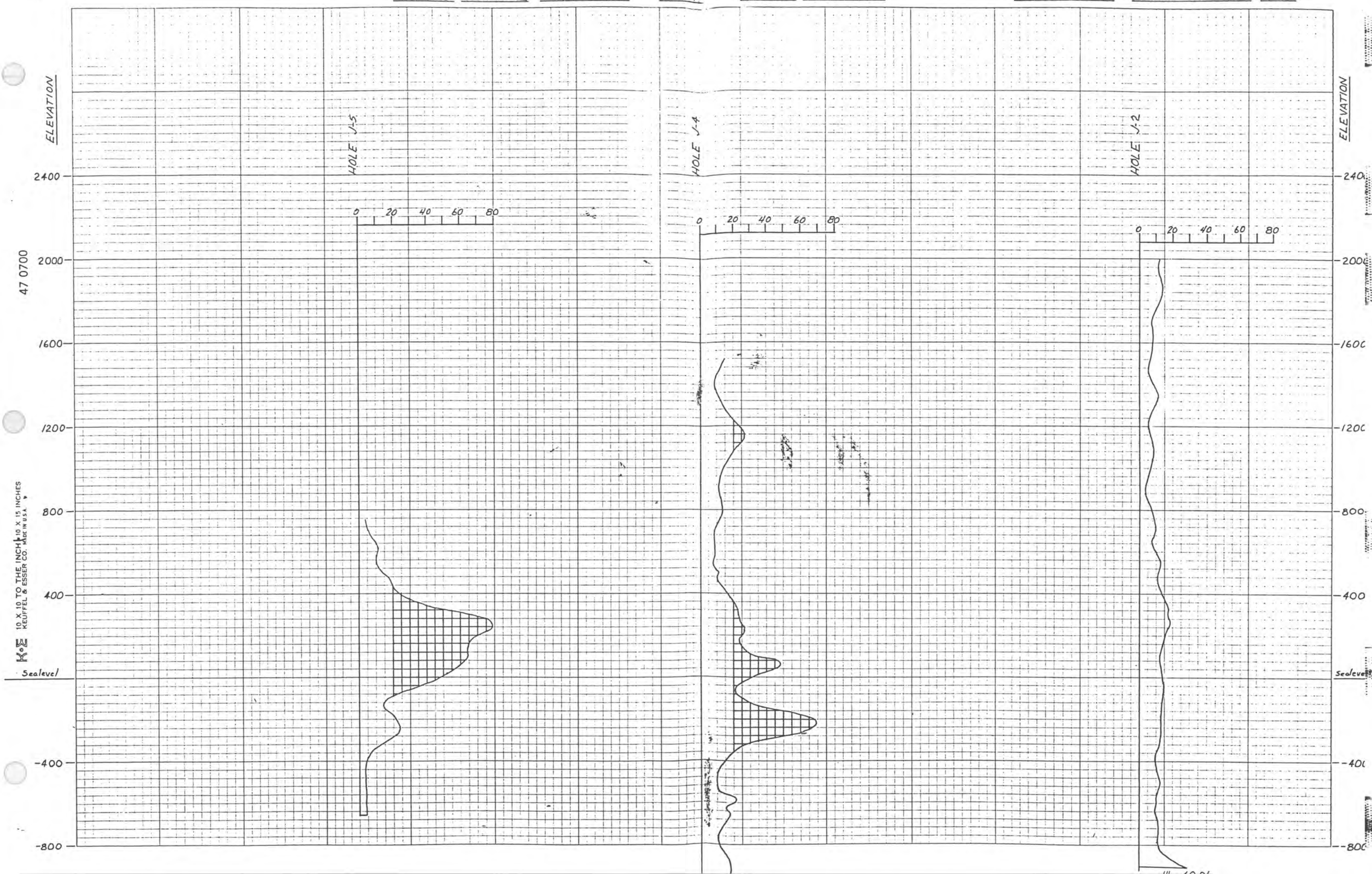
CITIES SERVICE MINERALS CORP. KELVIN PROJECT- ZINC (PPM)



CITIES SERVICE-MINERALS CORP. KELVIN PROJECT VOL. % MAGNETITE

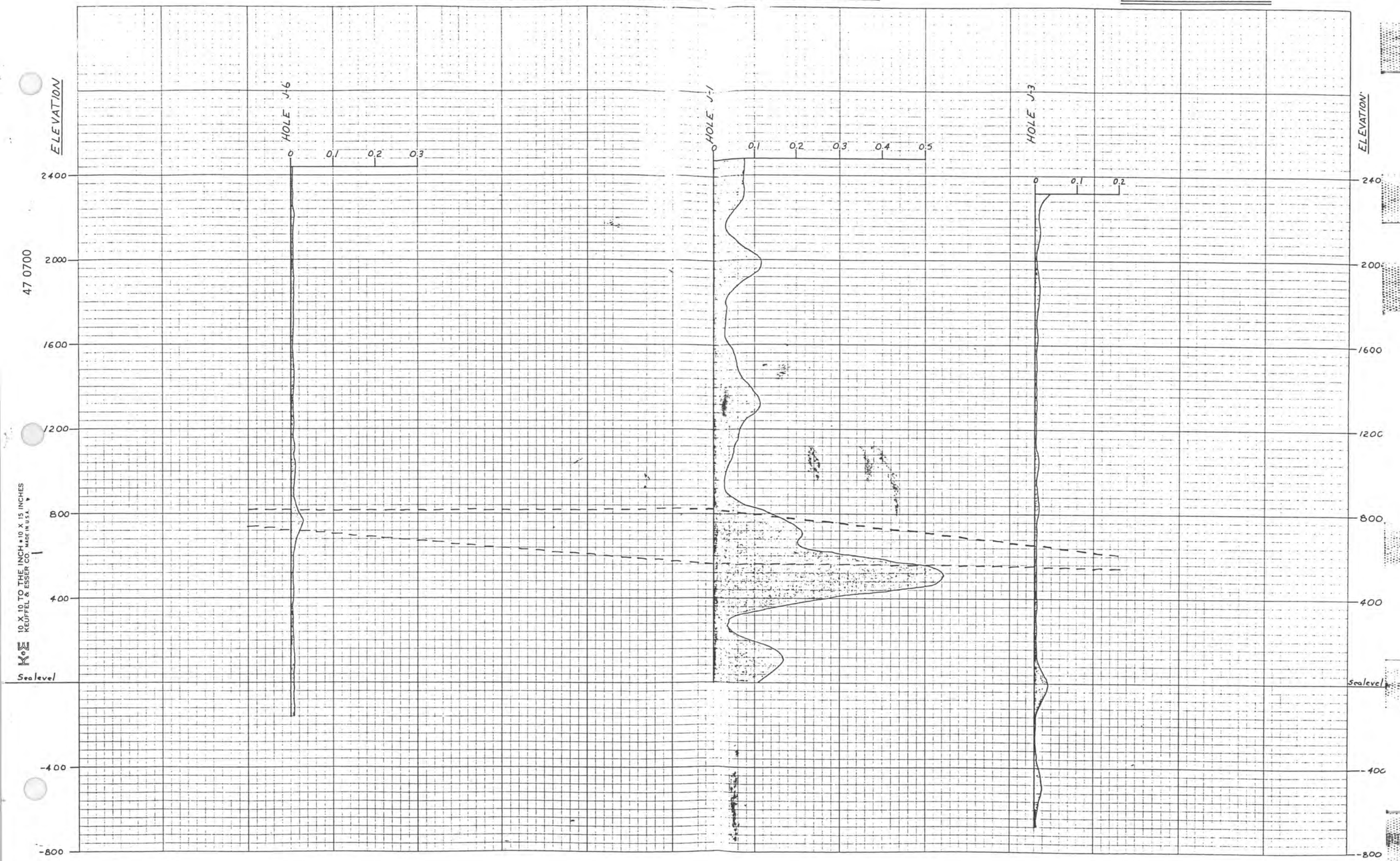


CITIES SERVICE MINERALS CORP KELVIN PROJECT CALCULATED CHARGEABILITY (Mc)



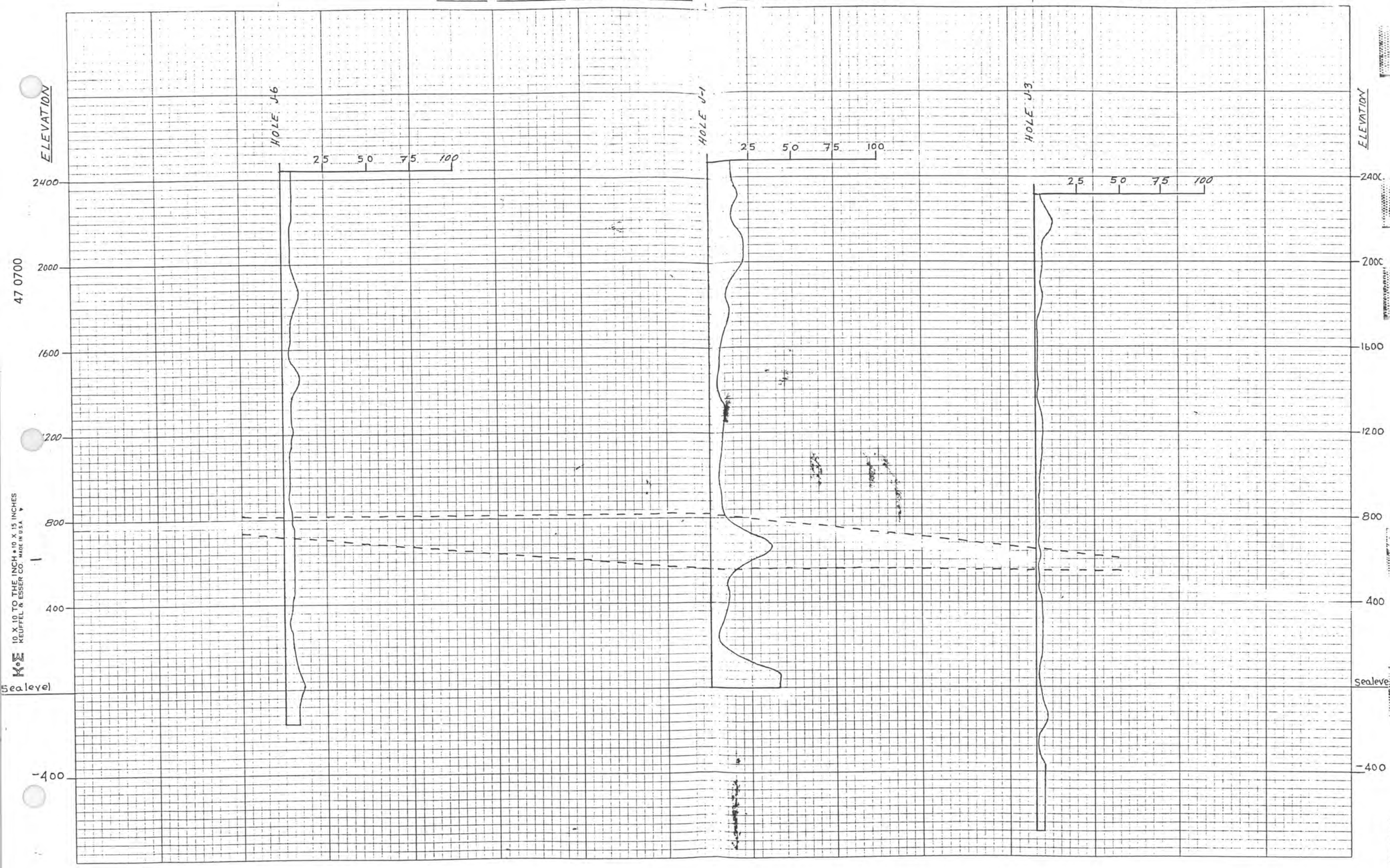
CITIES SERVICE MINERALS CORP. K:!VIN PROJECT

COPPER (PERCENT)



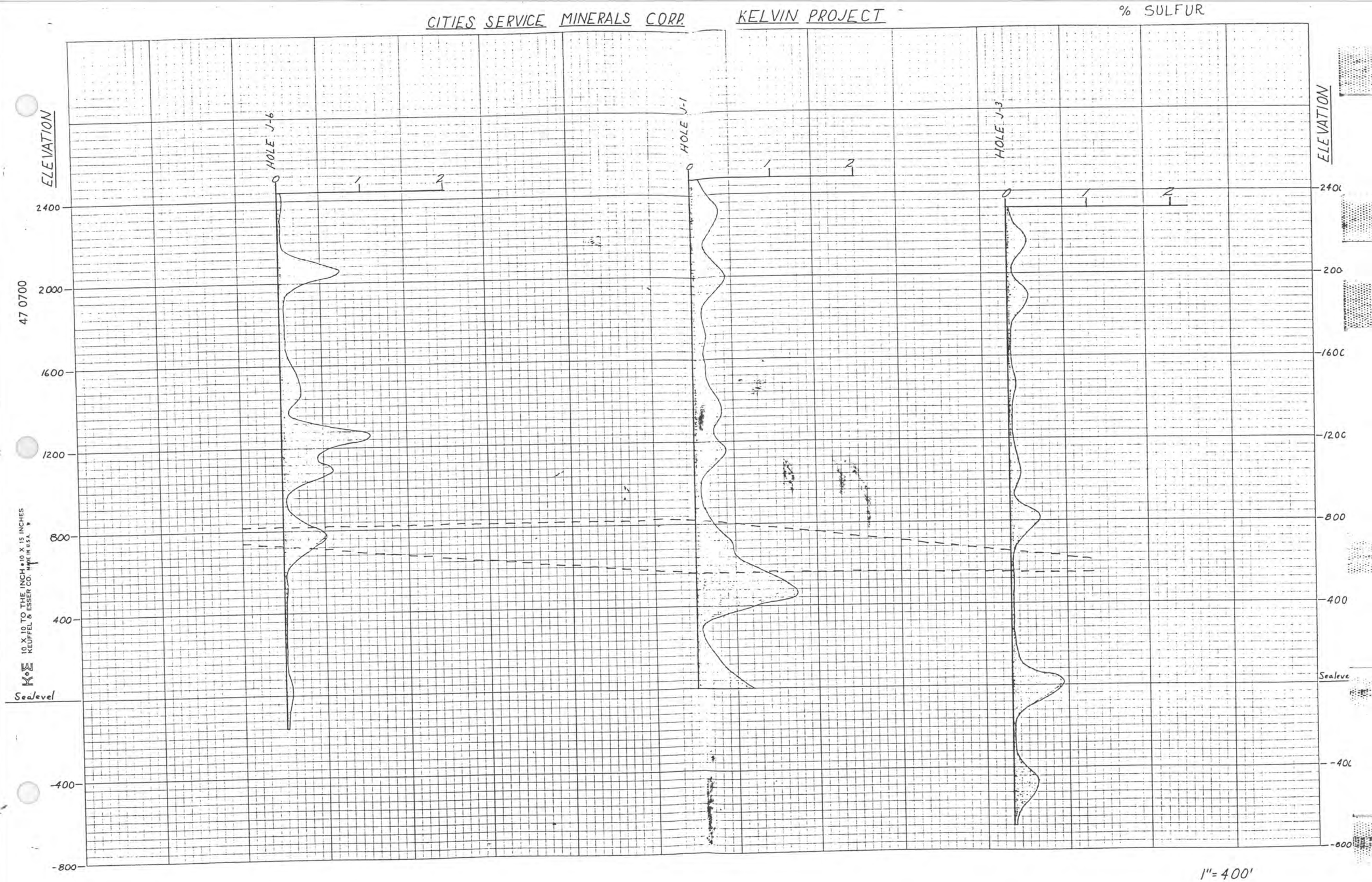
1"=400'

CITIES SERVICE MINERALS CORP. KILVIN PROJECT MOLYBDENUM (PPM)



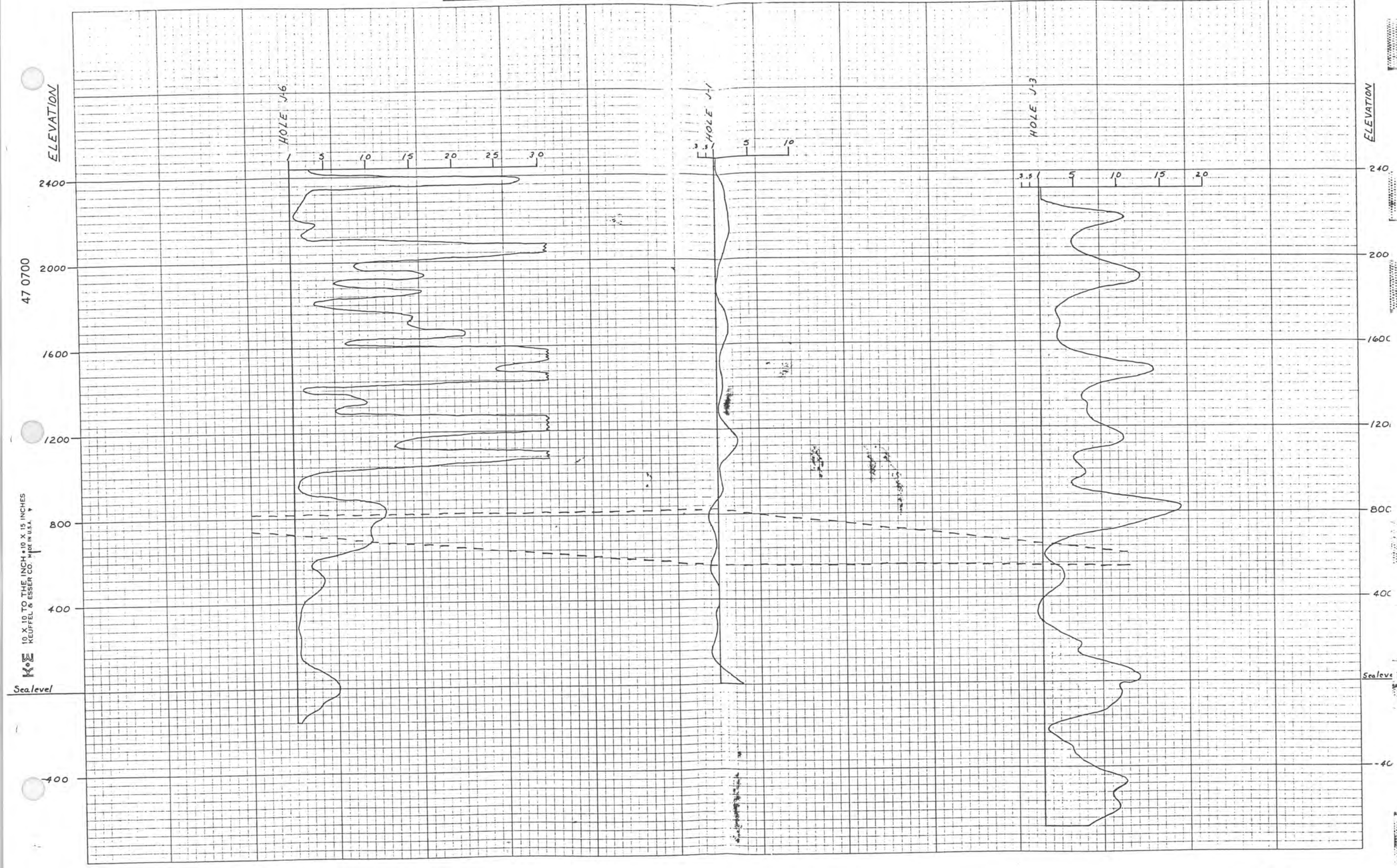
1" = 400'

CITIES SERVICE MINERALS CORP. KELVIN PROJECT



1"= 400'

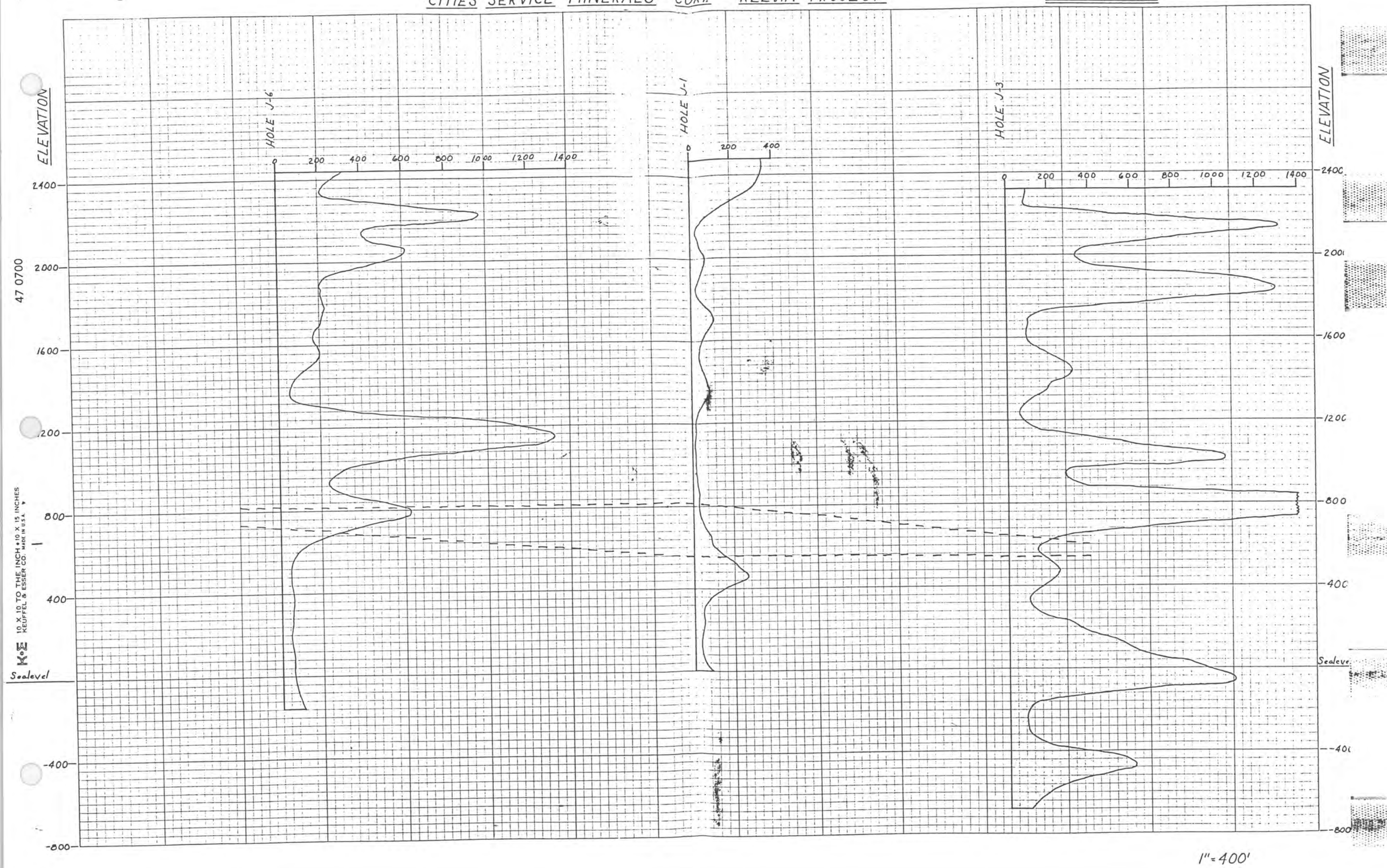
CITIES SERVICE MINERALS CORP. KELVIN PROJECT PYRITE ÷ CHALCOPYRITE



1" = 400

CITIES SERVICE MINERALS CORP. KELVIN PROJECT

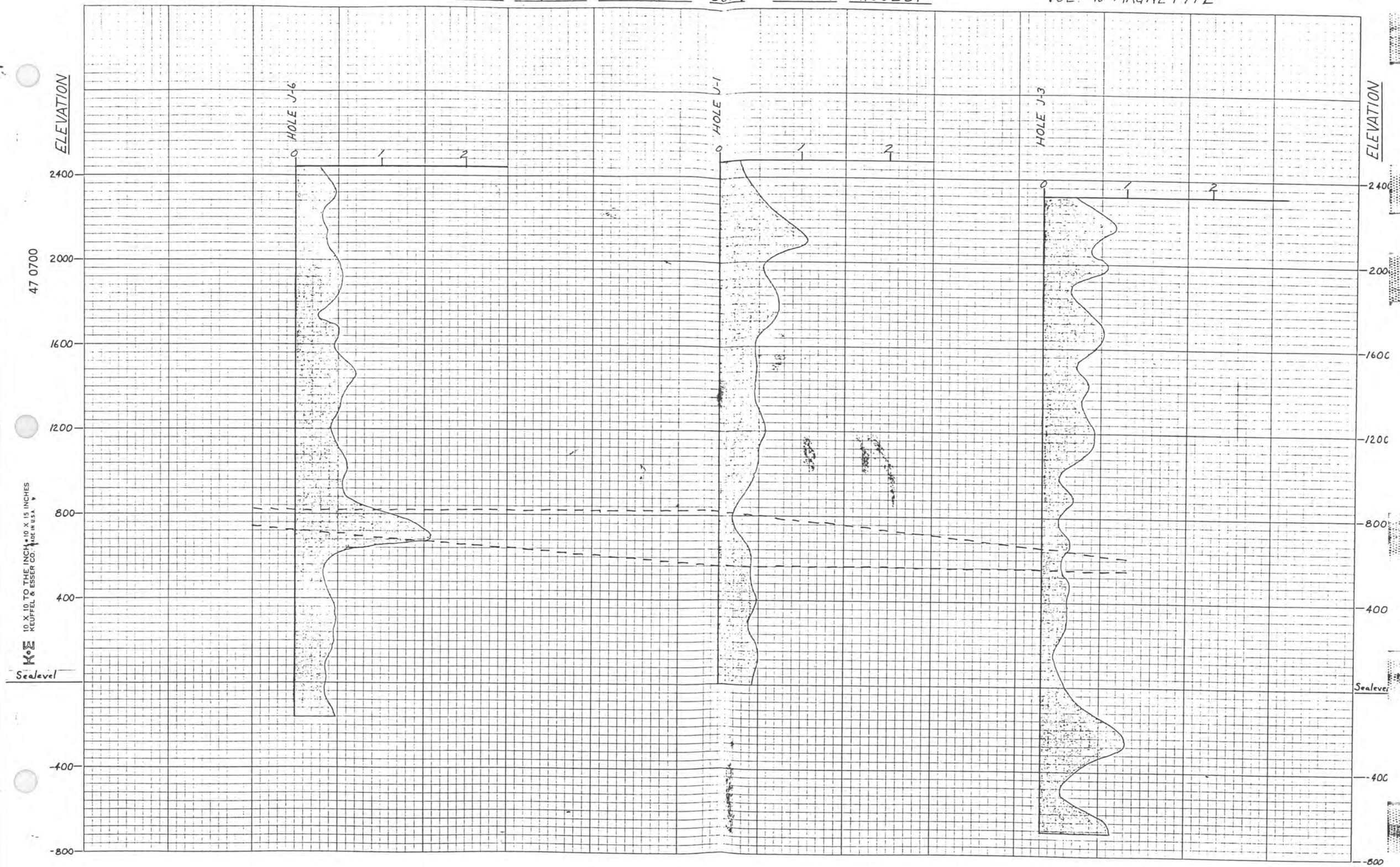
ZINC (PPM)



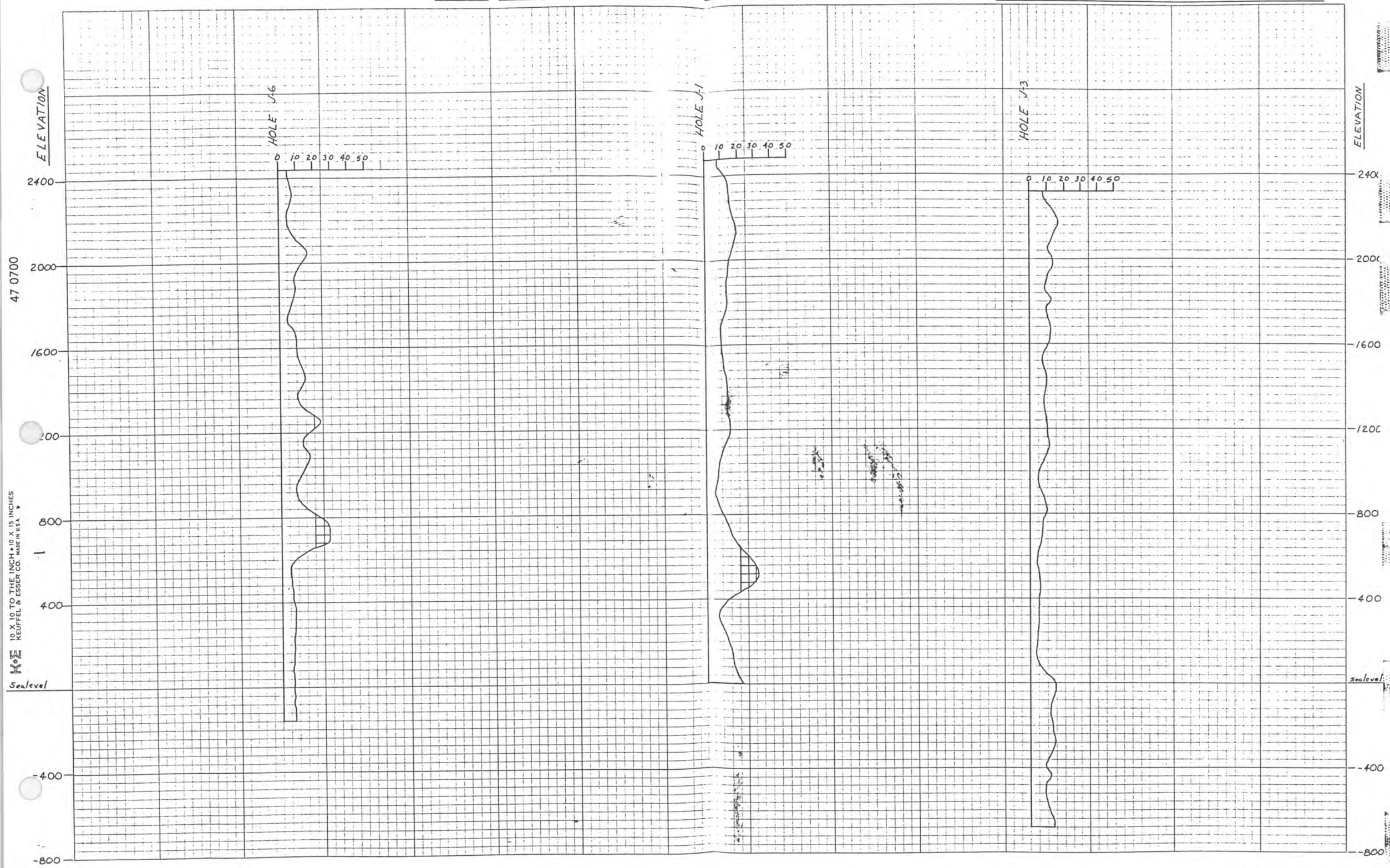
K&E 10 X 10 TO THE INCH • 10 X 15 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

CITIES SERVICE MINERALS CORP. KELVIN PROJECT

VOL. % MAGNETITE



CITIES SERVICE MINERALS CORP. KELVIN PROJECT - CALCULATED CHARGEABILITY (Mc)



GILA
RIVER
SOUTHERN PACIFIC
JEEP TRAIL
ARNOLD JOHNSON, ETAL.
FEDERAL UNPAT. LODE CLAIMS
C.S.M.C. OPTION
Golden Bell Mine
A-Diamond Ranch
J-7
J-4
J-2
J-5
KE-1
J-1
KM-6
J-6
J-3
RUIZ ETAL SIDEVIEW GROUP
C.S.M.C. OPTION
CSMC OPTION:
SHARP-HELMICK STATE PROSPECTING PERMIT
CSMC STATE PROSPECTING PERMIT
Spring
Radio Tower
Zellweger
Wash
MINBANCO HOLES HAVE
NO PREFIX

FILE NO.

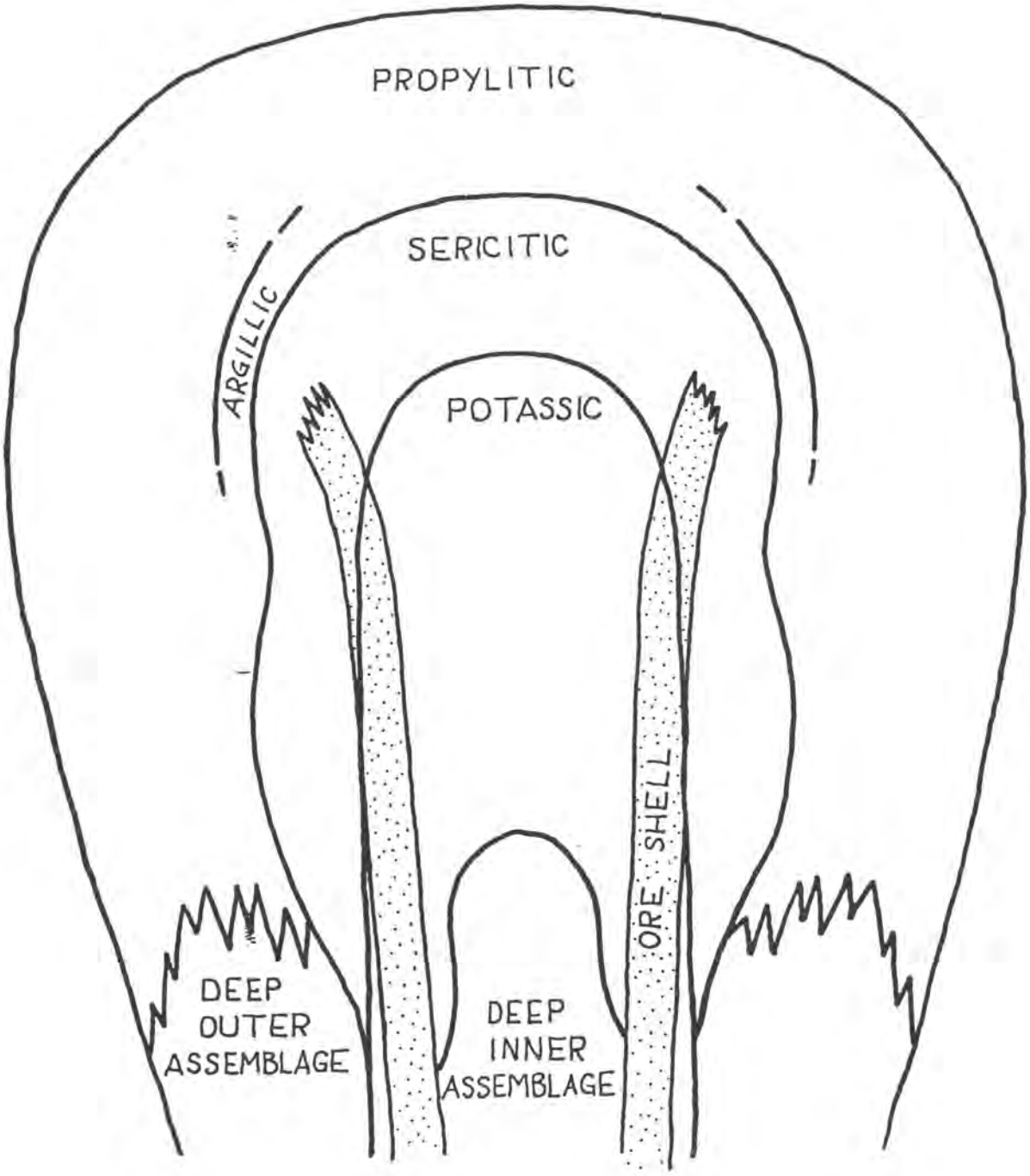
CITIES SERVICE MINERALS CORPORATION

SCALE None

DATE 6 June 77

DRAWN BY C.H. Roe

LOWELL & GUILBERT MODEL



TITLE

SKETCH NO.

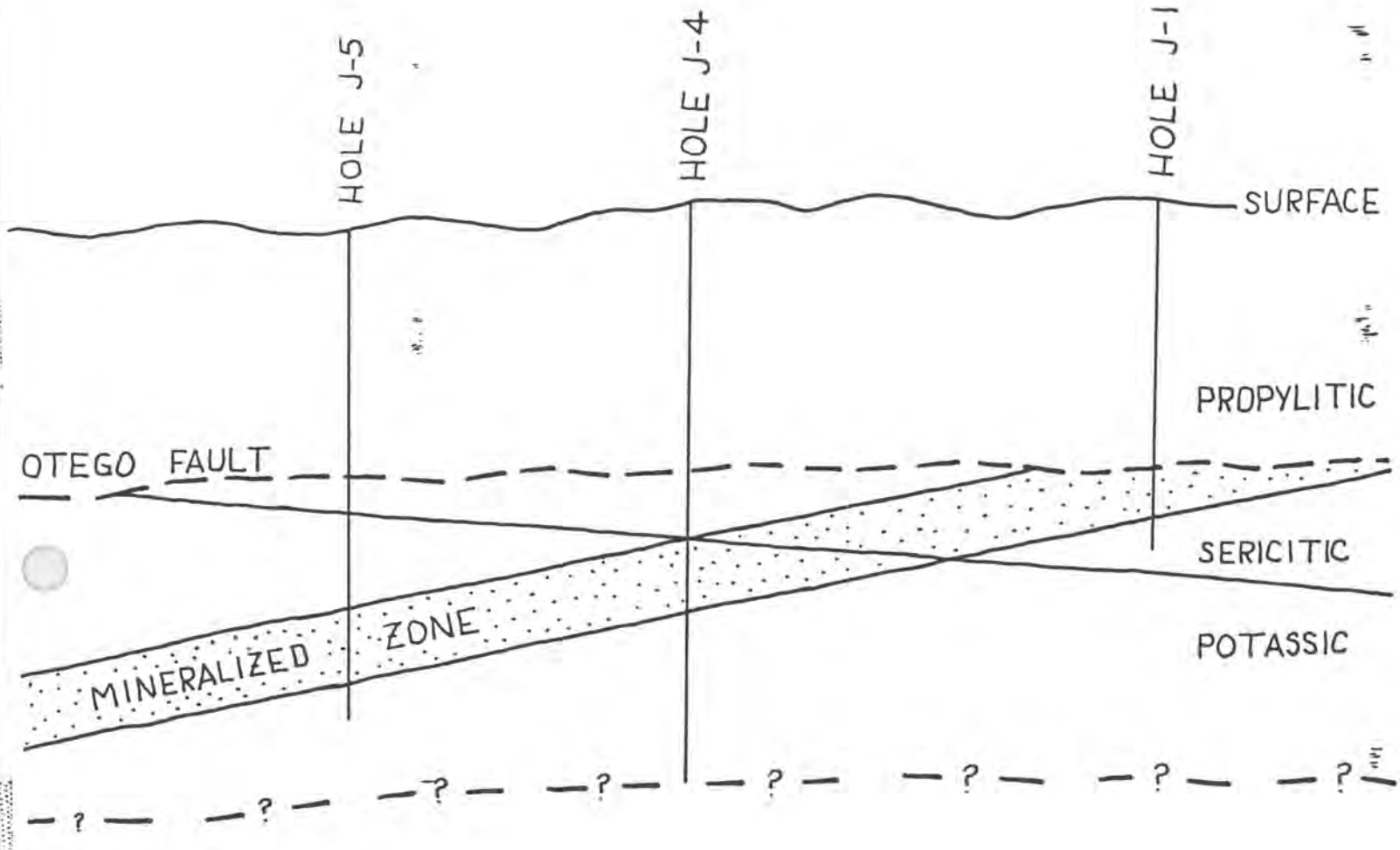
FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE

DATE 6 June, 73

DRAWN BY C. H. Roe



TITLE

SKETCH NO. 2

BY [illegible] DATE [illegible] SUBJECT [illegible]

CHKD. BY DATE

COLUMN - KELVIN PROJECT - PINAL CO., ARIZONA (HOLES J1 - J6).

JOB NO.

REC

Qal

Quaternary alluvium: unconsolidated medium-grained with fragments of Precambrian Oracle Granite, diabase, diorite and quartz

← Tertiary [illegible]

LARAMIDE

TKgp III

Tertiary-Cretaceous Granodiorite Porphyry III: a medium-gray rock with plagioclase phenocrysts up to 0.25 inch in a medium-grained (0.1 inch) groundmass of plagioclase, quartz, biotite, magnetite and interstitial K-spar. Chilled margins up to 20 feet are common (in which the slightly porphyritic texture is absent. Appears to cut Ttc in hole KE-1. The most equigranular of the Laramide porphyritic rocks.

TKgp II

Tertiary-Cretaceous Granodiorite Porphyry II: a medium to dark gray rock with 50 [redacted] percent phenocrysts of anhedral quartz up to 0.3 inch in diameter, subhedral plagioclase up to 0.4 inch in length and euhedral to subhedral biotite up to 0.1 inch in a medium grained groundmass of K-spar, quartz and biotite (some of which may be secondary). Magnetite = 0.27%. Much darker in appearance than Teacup Granodiorite (when both are fresh) although they may be closely related. The two units are clearly distinguished in hole KE-1. May be correlative with Rhyodacite Porphyry (Tr_2) of the U.S.G.S.

Ttc a

63 m.y.b.p.

Paleocene Teacup Granodiorite: a medium to light gray rock with 50 to 60 percent phenocrysts of (in order of decreasing abundance) plagioclase up to 0.3 inch in length, subhedral quartz up to 0.3 inch and biotite up to 0.2 inch in a fine to medium grained groundmass of quartz, K-spar (minor) plus plagioclase, biotite and possible hornblende. Magnetite = 0.18 - 0.23%. Ttca = aplitic facies (light gray in color).

TK Mr

Tertiary-Cretaceous Melanocratic Rhyodacite Porphyry: approximately 20 percent phenocrysts of (in order of decreasing abundance) subhedral plagioclase up to 0.4 inch, rounded (embayed) quartz up to 0.1 inch with hornblende and/or biotite up to 0.1 inch in a matrix of the same minerals plus K-spar. Magnetite content (variable) averages 0.8 percent.

Kb

Cretaceous (?) Intrusive Breccia: angular to subrounded (subordinate) fragments of Precambrian Oracle and Diabase and Quartz, K-feldspar and Plagioclase in a matrix of angular fragments of quartz, K-feldspar, plagioclase, possible fine-grained clay and interstitial K-spar and pyrite. Crystals are not fractured. Matrix is generally dark gray to black. Contacts indicate a clear intruse emplacement for these rocks. Interpreted to be due to fluidization.

YOUNGER PRECAMBRIAN

Ydb

1140 m.y.b.p.

Younger Precambrian (?) Diabase: both fine-grained and coarse-grained varieties are present.

Yr a

1430 m.y.b.p.

Younger Precambrian Oracle (Ruin) Granite: porphyritic quartz monzonite with numerous pink, euhedral K-spar phenocrysts up to 1.5 inch in length; plagioclase crystals, generally euhedral up to 0.25 inch in diameter in a coarse-grained groundmass of quartz, K-spar, plagioclase, biotite and minor magnetite and hornblende.

OLDER PRECAMBRIAN

YX md

1630 m.y.b.p.

Younger-Older Precambrian Madera Diorite:

X ps

1700 m.y.b.p.

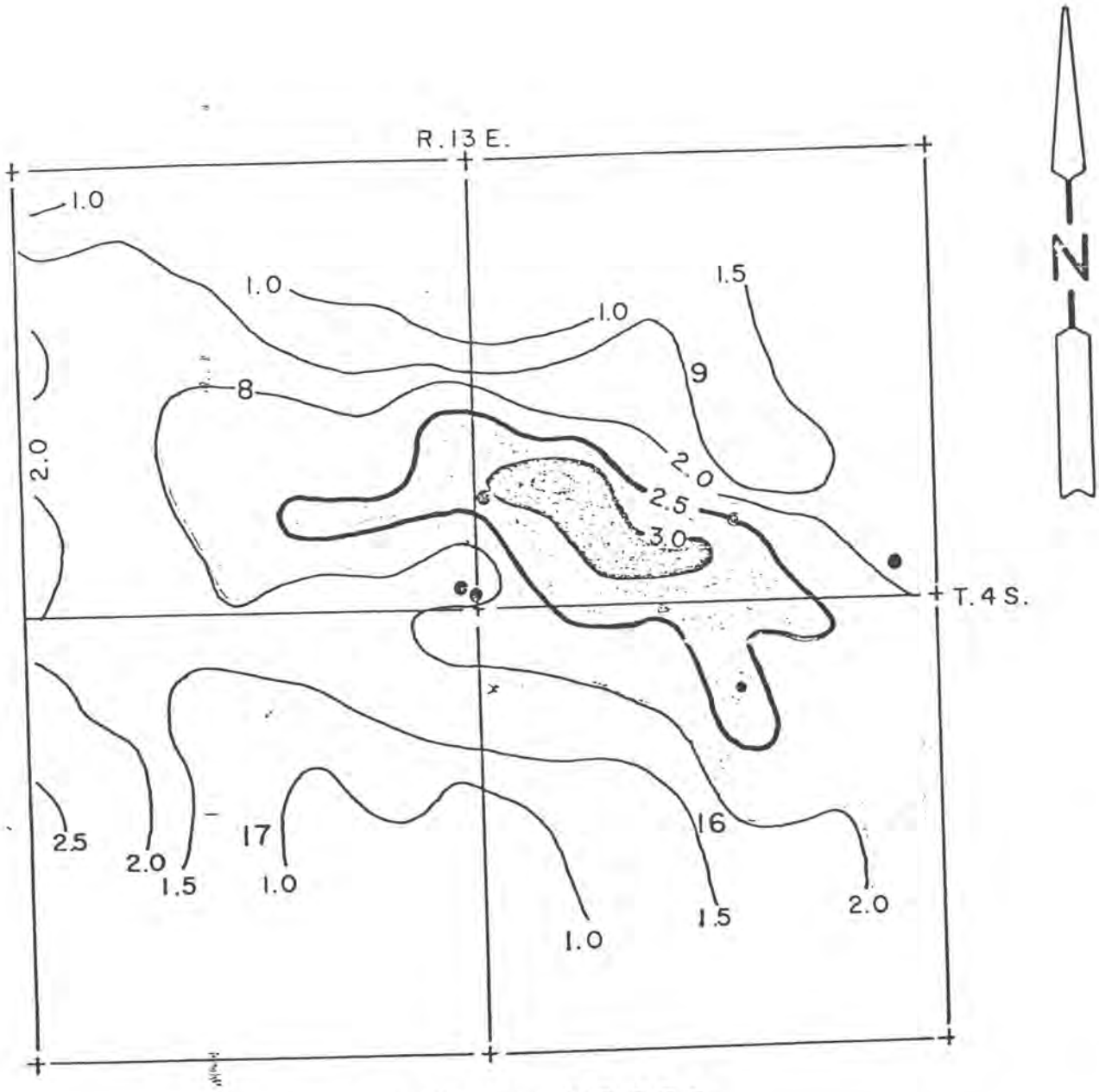
Older Precambrian Pinal Schist:

at Kelvin seen only as inclusions in Younger Precambrian Oracle Granite.

FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE 1:24,000
DATE 31 JAN 74
DRAWN BY J.P.V.



contour interval = 0.5 P.F.E.

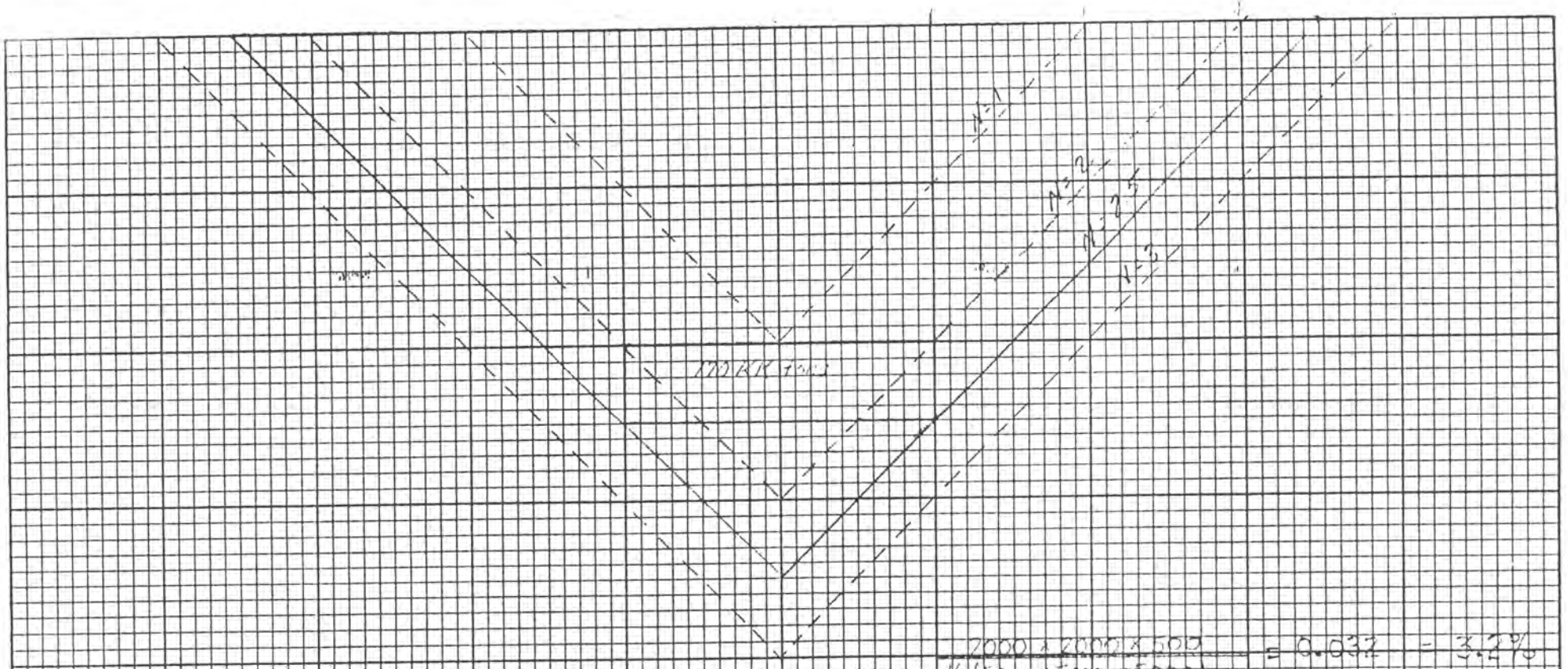
● = existing drill hole

TITLE KELVIN PROSPECT - APPARENT PERCENT FREQUENCY EFFECT AT "n" = 1 SKETCH NO. 6

(P.F.E. over 2.5 % in red)

K+E 10 X 10 TO THE INCH 7 X 10 IN. • ALBANENE® KEUFFEL & ESSER CO. 46 0707 MADE IN U.S.A.

$\alpha = D_1$



$$\frac{2000 \times 2000 \times 500}{\frac{1}{2}(5000 \times 5000 \times 5000)} = 0.032 = 3.2\%$$

$$\frac{500 \times 2000}{\frac{1}{2} \times 5000 \times 5000} = 0.8 = 8\%$$

$30 \times .08 = 2.4$

assume true response = 30 above background

∴ measured "apparent" increase = 0.96

1.00% Ca = 1.8363 vol. % Cp

1.5494 vol % Cp

3.3857 vol % sulfide

x 15

≈ 51

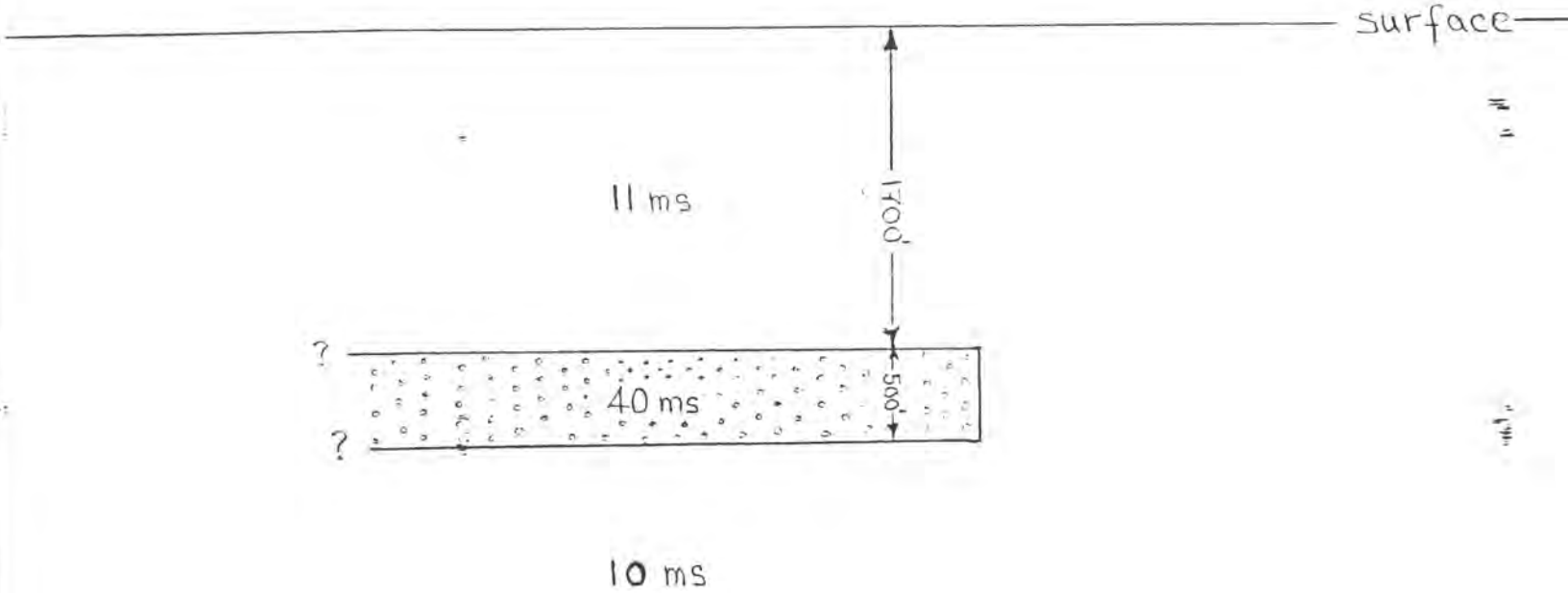
FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE

DATE

DRAWN BY



True Response = 30 ms above a background of 10 ms.

$\rho_2/\rho_1 = 1$ $\rho_3/\rho_1 = 1$

DIPOLE-DIPOLE

n	$\%\beta_1$	$\%\beta_2$	$\%\beta_3$	read
1	95	3	<2	11.8
2	73	14	13	14.9
3	52	19	29	16.2
4	38	19	43	16.1
5	28	18	54	15.7
6	22	14	64	14.4

4.4 = Ma max.

β_1 = 11 ms
β_2 = 40 ms
β_3 = 10 ms

POLE-DIPOLE

n	$\%\beta_1+\beta_3$	$\%\beta_2$	read
1	92	8	12.4
2	85	15	14.5
3	85	15	14.5
4	87	13	13.9
5	90	10	13.0
6	92	8	12.4

2.1 = Ma max.

$\beta_1 - \beta_2$ = 10 ms
β_2 = 40 ms

TITLE

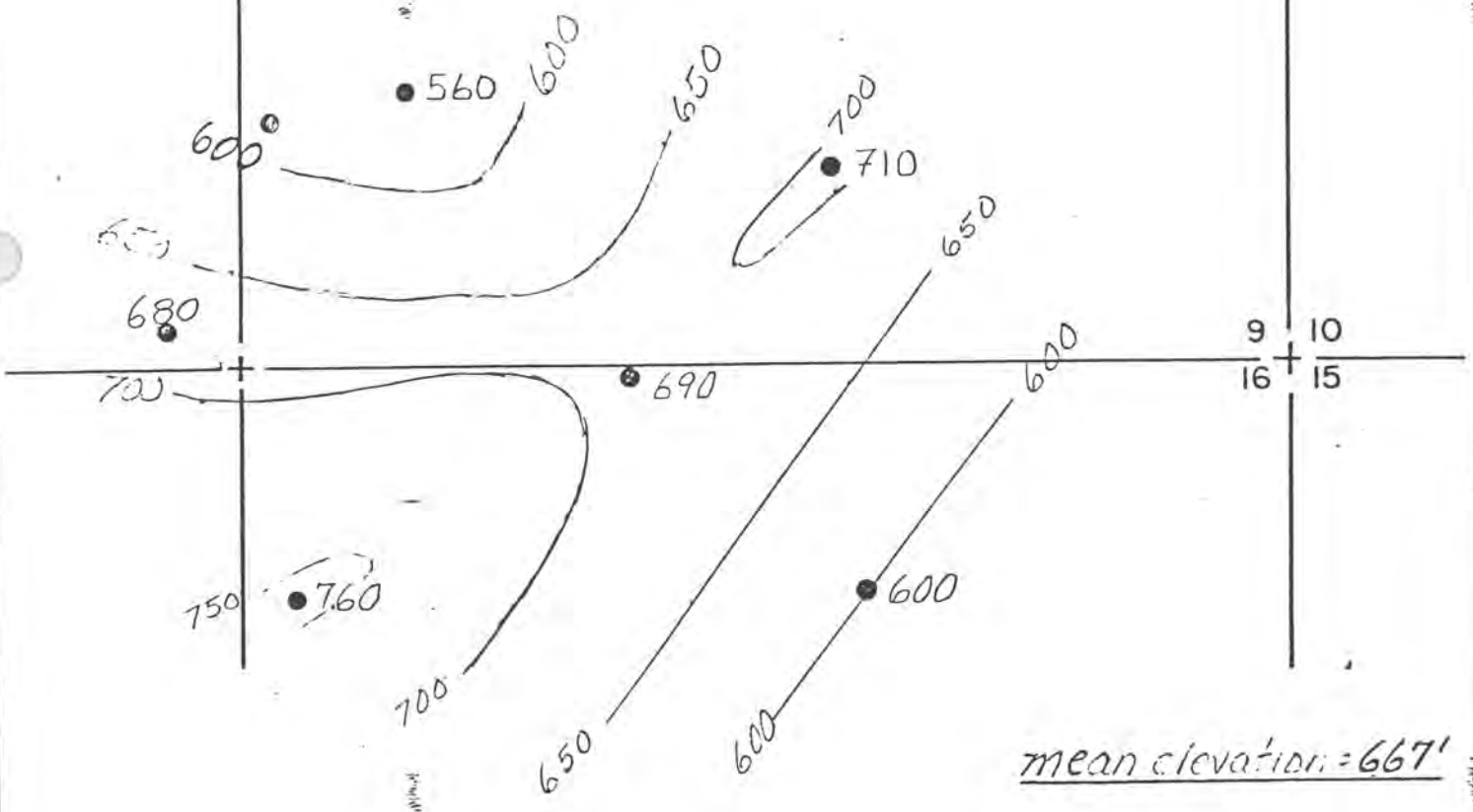
SKETCH NO.

KELVIN PROJECT

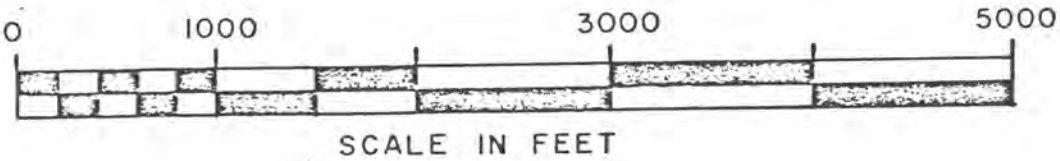
T. 4 S., R. 13 E.

PINAL CO., ARIZONA

ELEVATION: MIDDLE OF "OTEGO" FAULT



mean elevation = 667'



JULY 1976

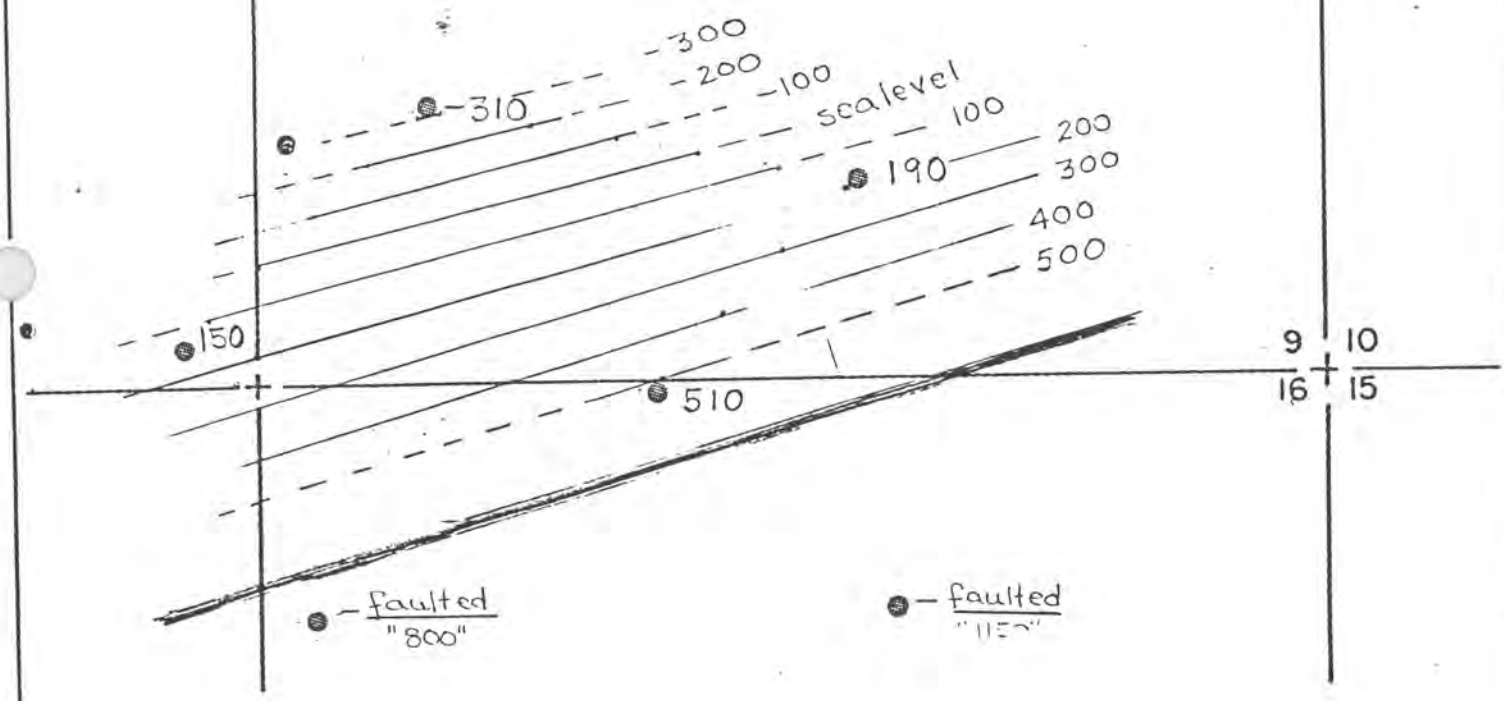
J. P. VROMAN

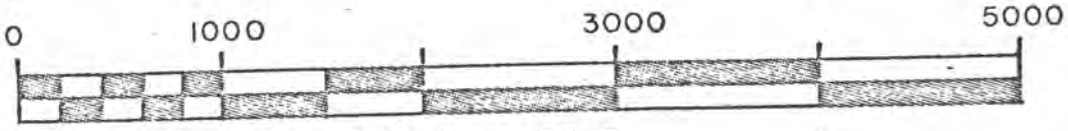
KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

ELEVATION OF "PEAK" OF COPPER ZONE





SCALE IN FEET

JULY 1976

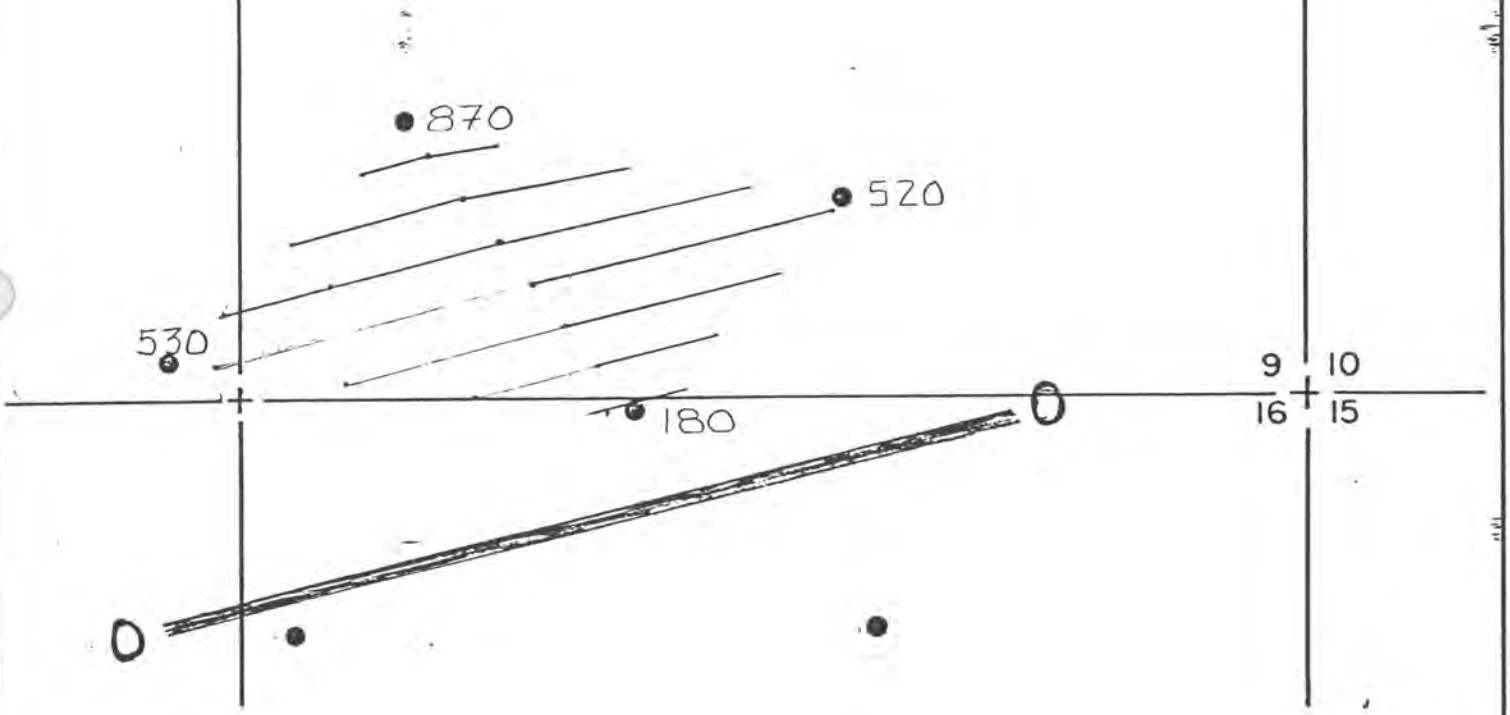
J. P. VROMAN

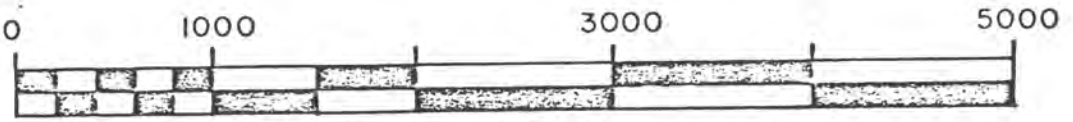
KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

DISTANCE BELOW OTEGO FAULT
OF PEAK OF COPPER ZONE





SCALE IN FEET

JULY 1976

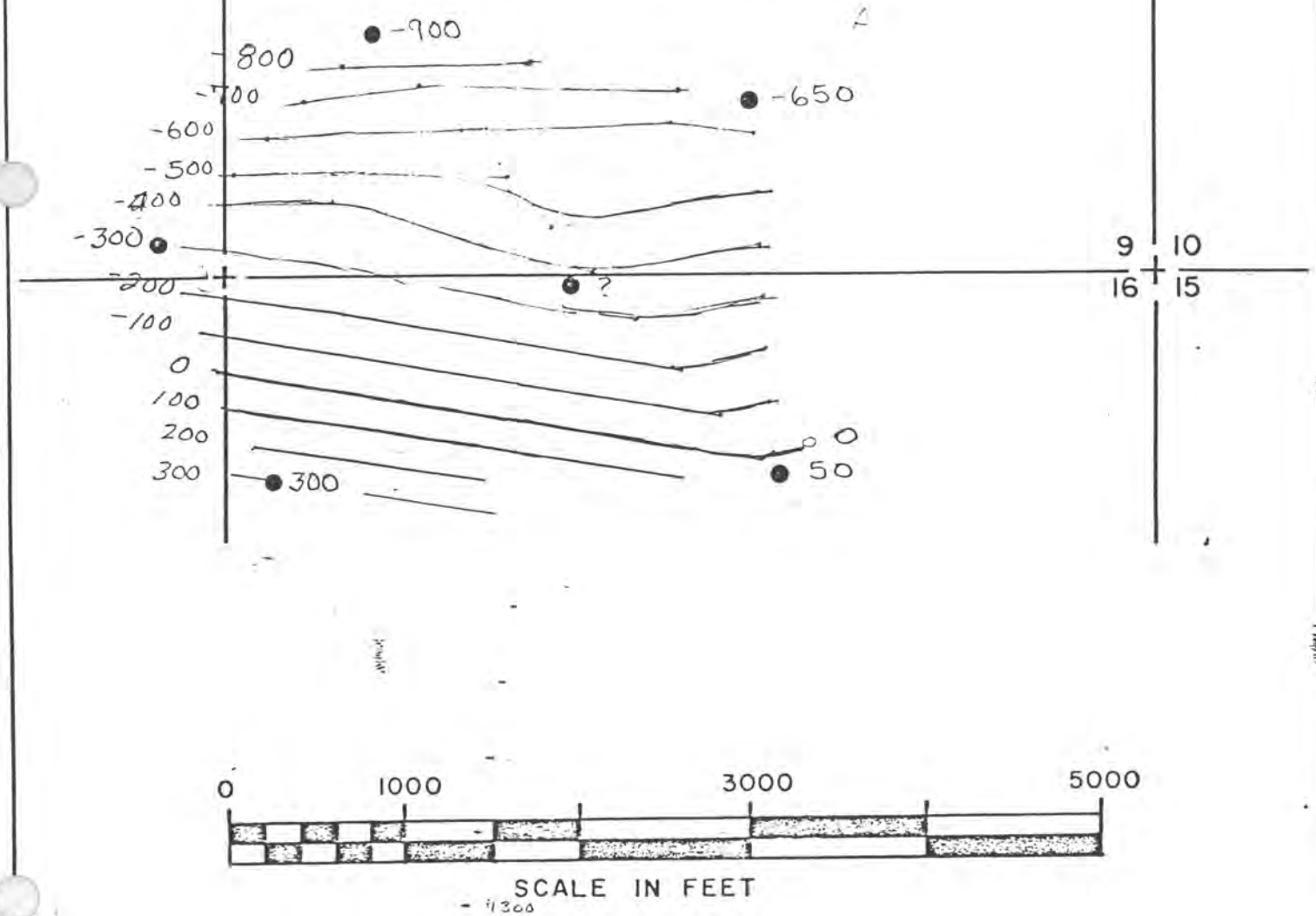
J. P. VROMAN

KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

ELEVATION OF "LOWER" FAULT



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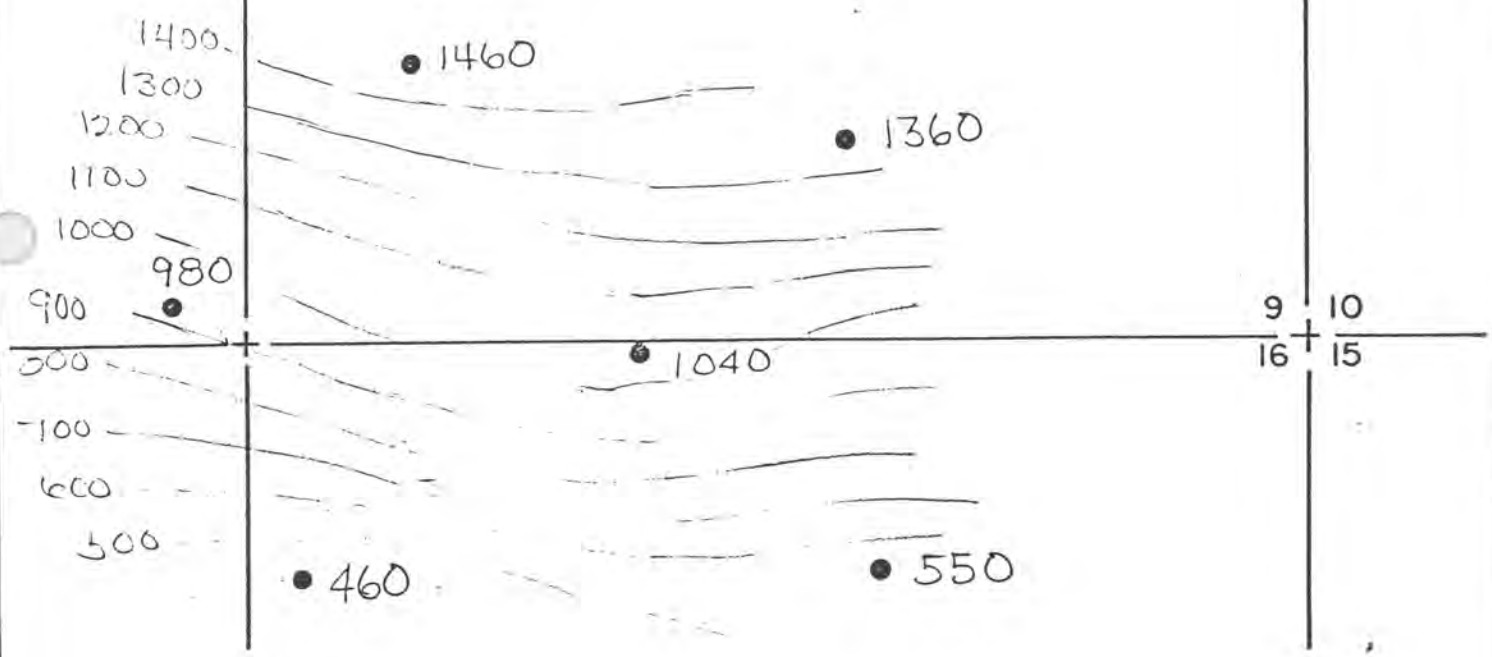
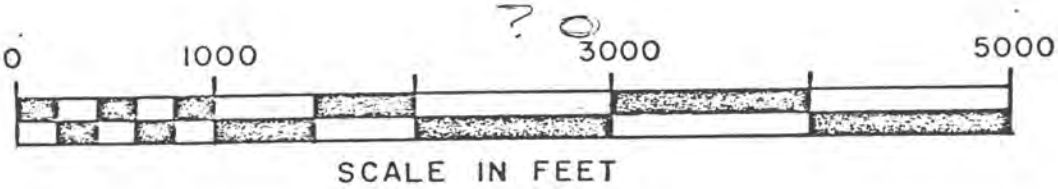
T. 4 S., R. 13 E.

PINAL CO., ARIZONA

THICKNESS OF "MIDDLE" BLOCK
(BETWEEN OTEGO & LOWER FAULTS





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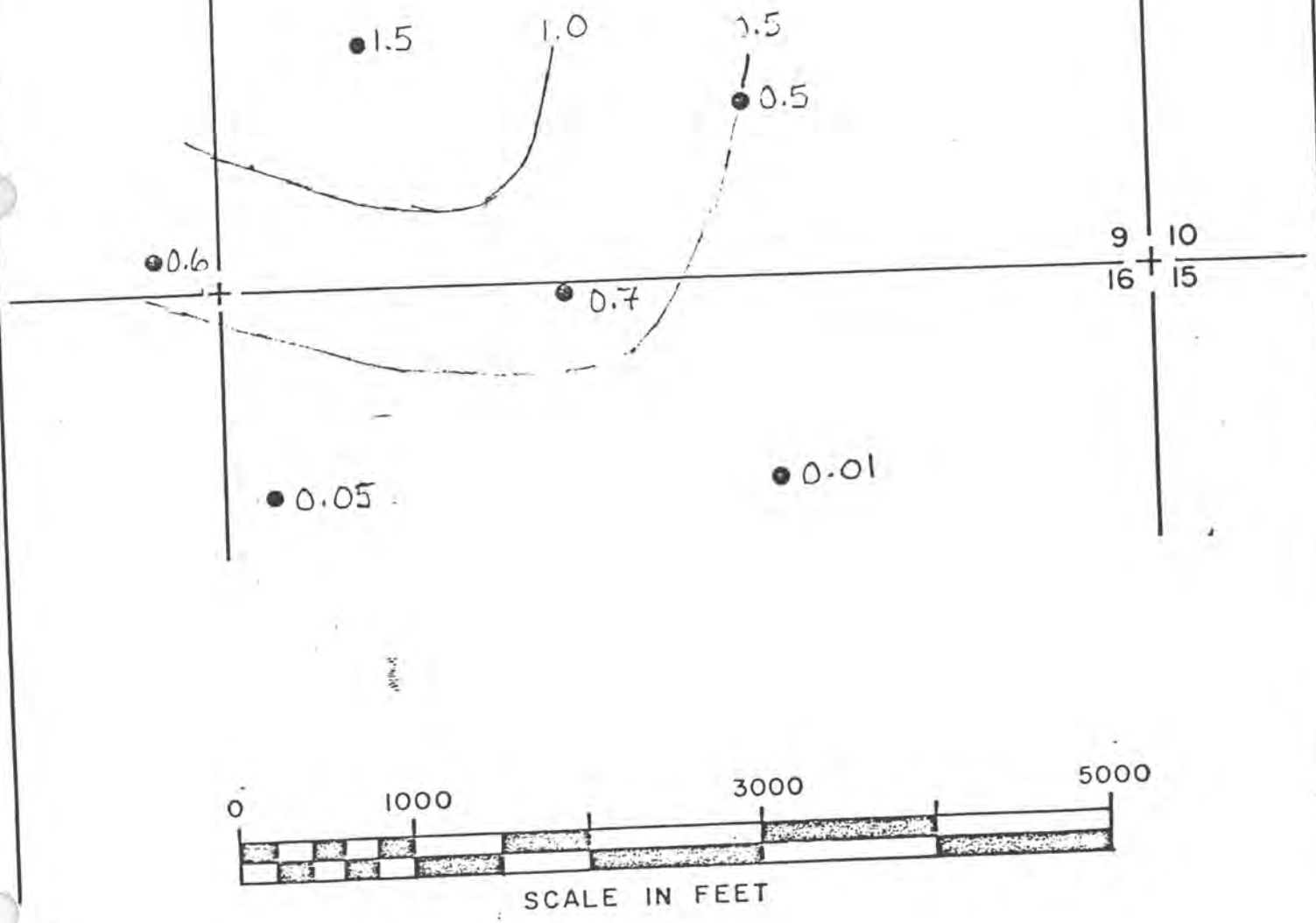
INTENSITY OF SULFUR "RADIALLY" (%)



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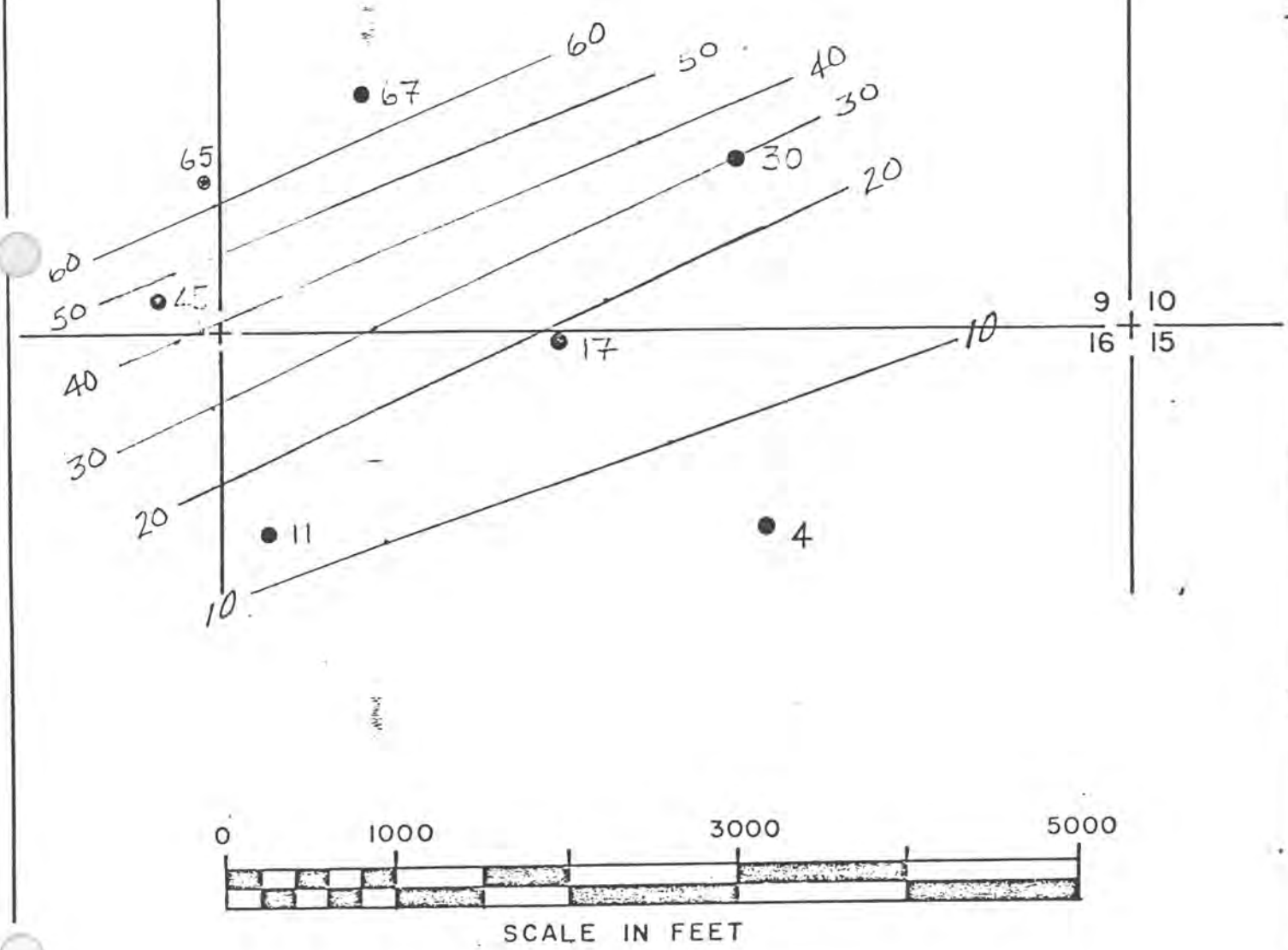
PINAL CO., ARIZONA

INTENSITY OF [illegible] "ANOMALY"

(PPM)



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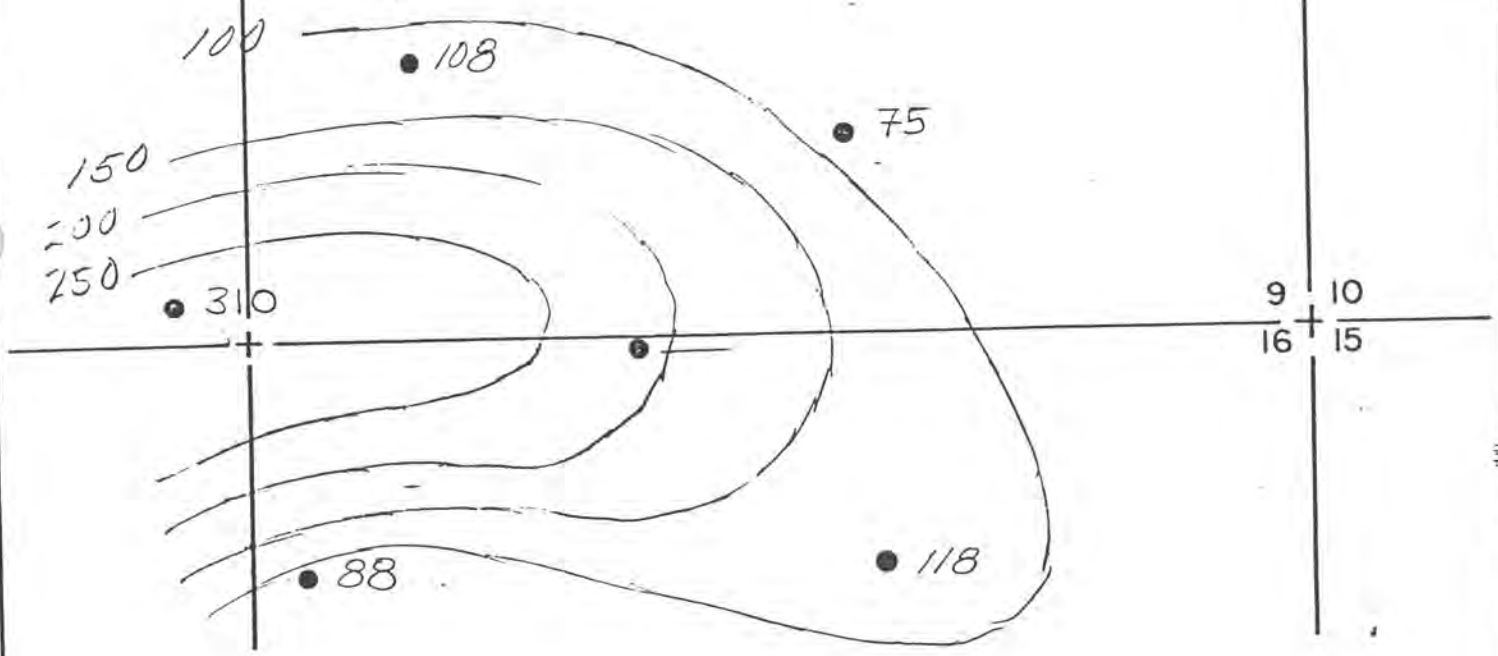
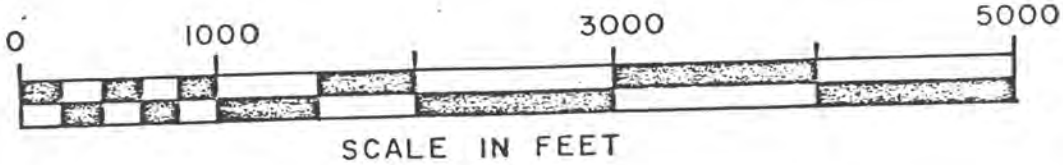
COPPER BELOW LOWER FAULT (PPM)





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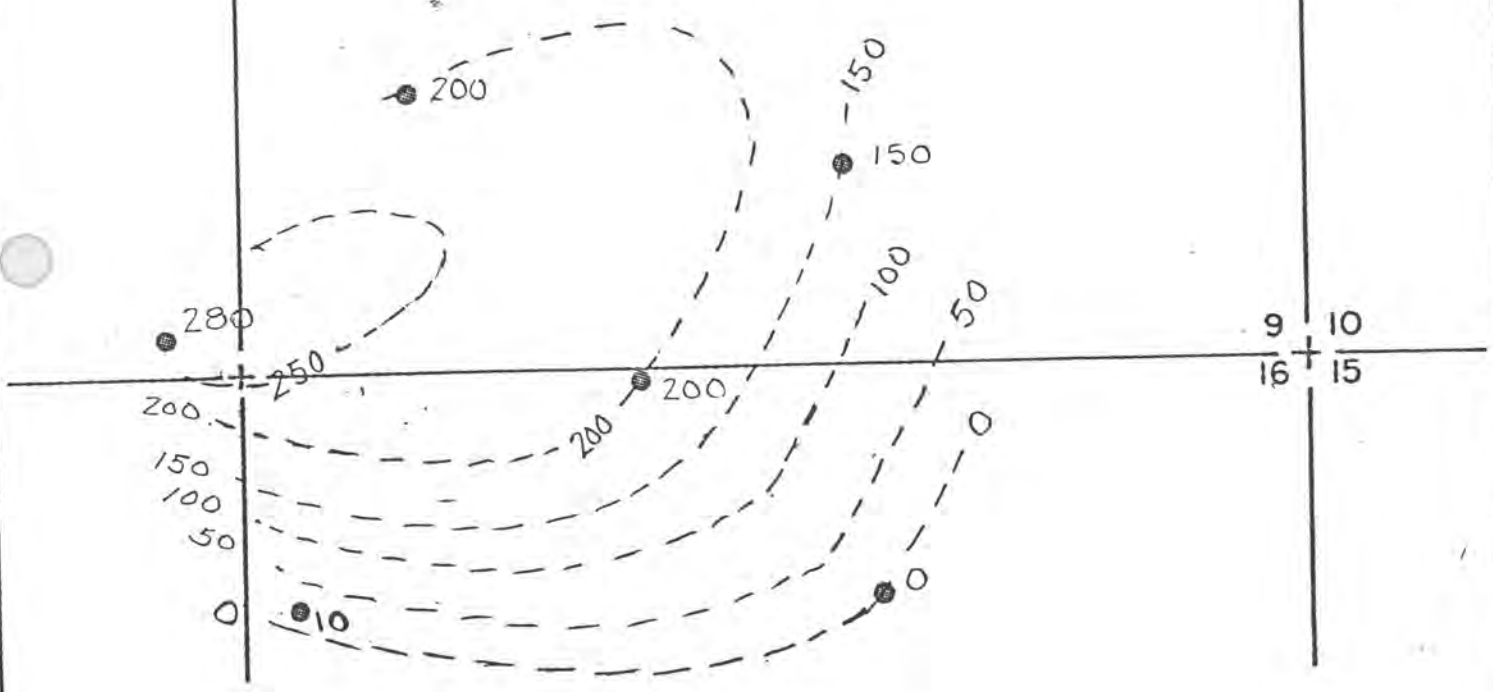
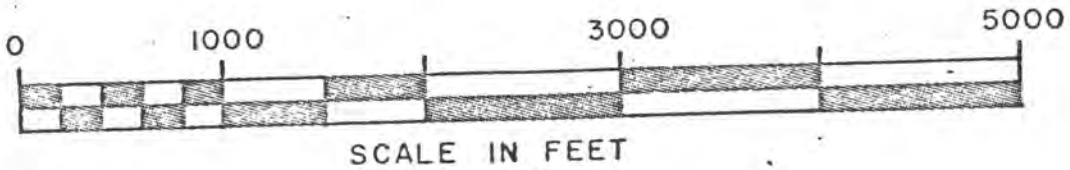
THICKNESS OF > 0.2% COPPER (- - - -)





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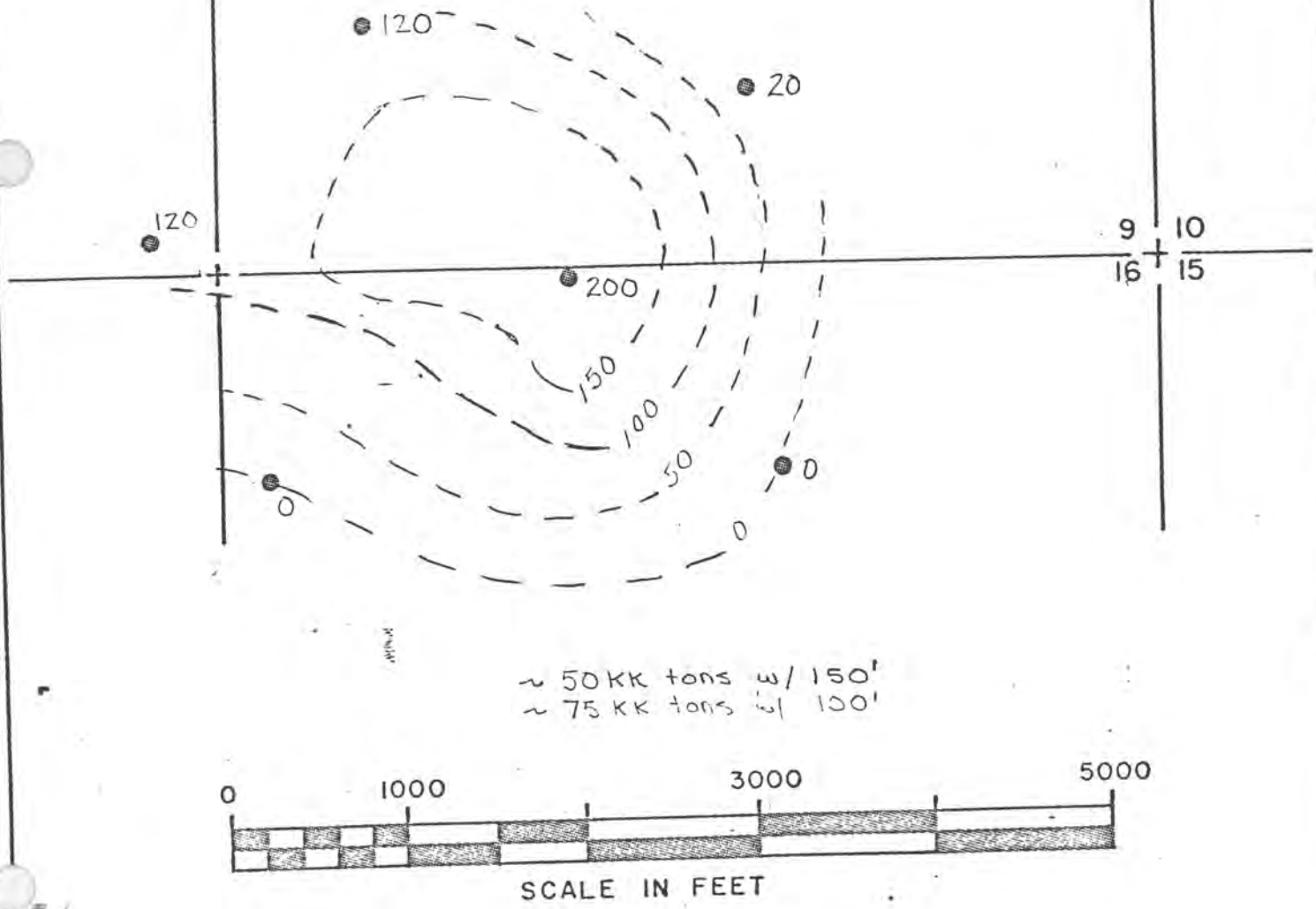
PINAL CO., ARIZONA

THICKNESS OF > 0.3% COPPER



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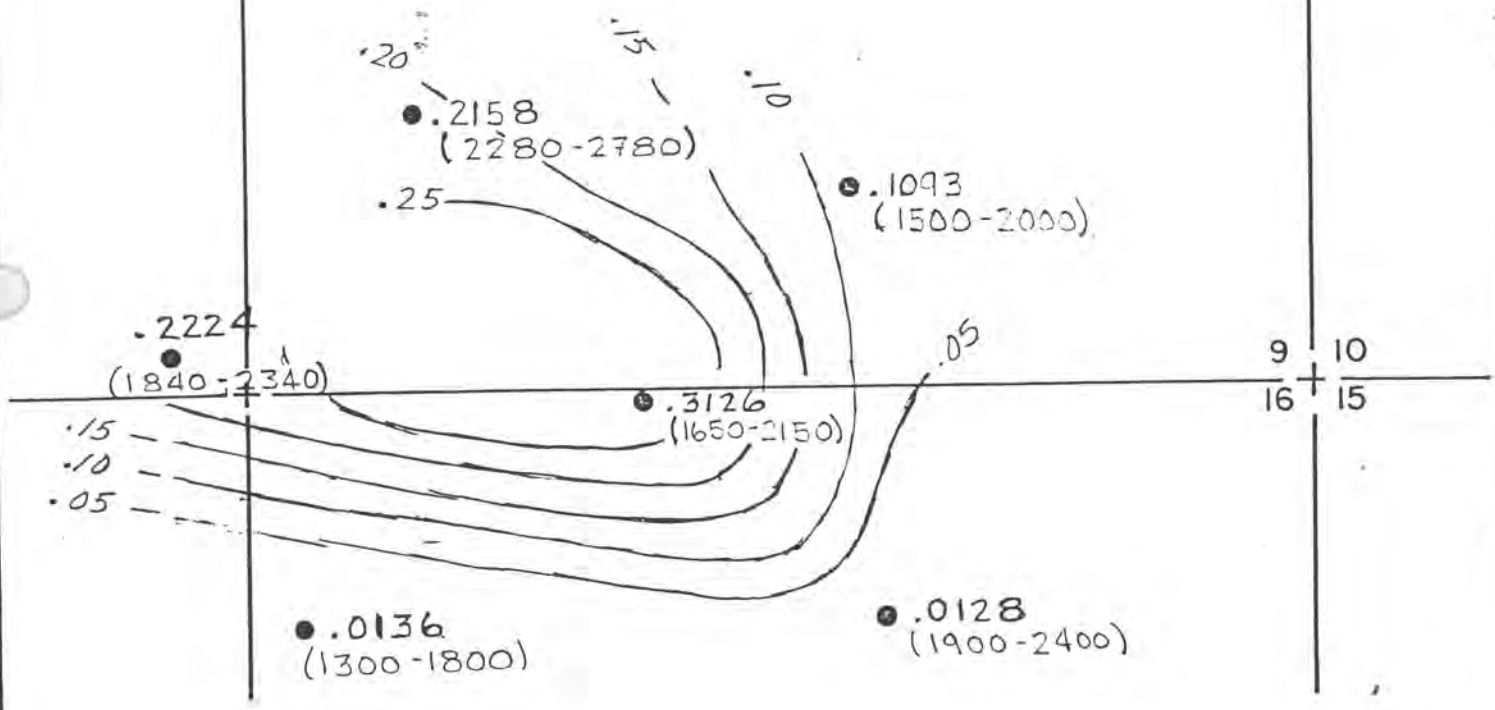
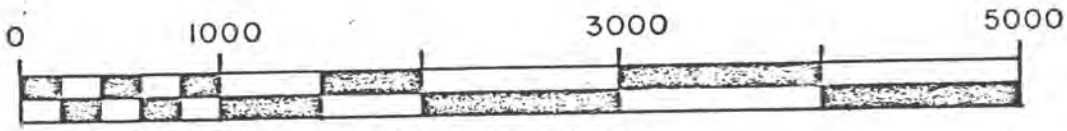
T. 4 S., R. 13 E.

PINAL CO., ARIZONA

BEST 500' INTERCEPT



>.25% = 2200 × 1600 × 500 ≈ 150 KK TONS



SCALE IN FEET

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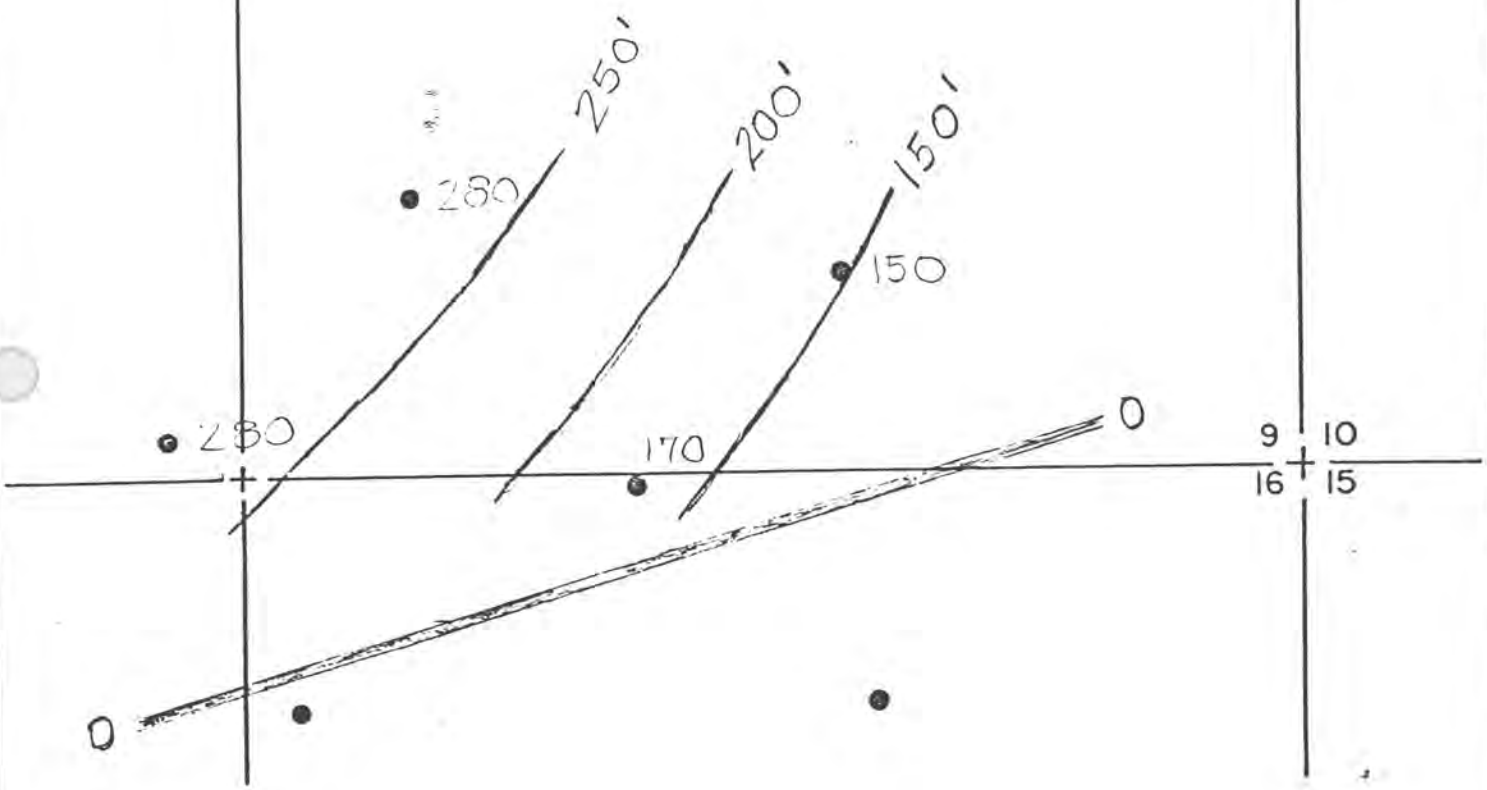
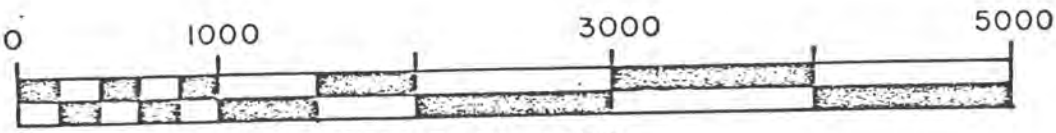
T. 4 S., R. 13 E.

PINAL CO., ARIZONA

THICKNESS OF "MIDDLE" COPPER ZONE





SCALE IN FEET

JULY 1976

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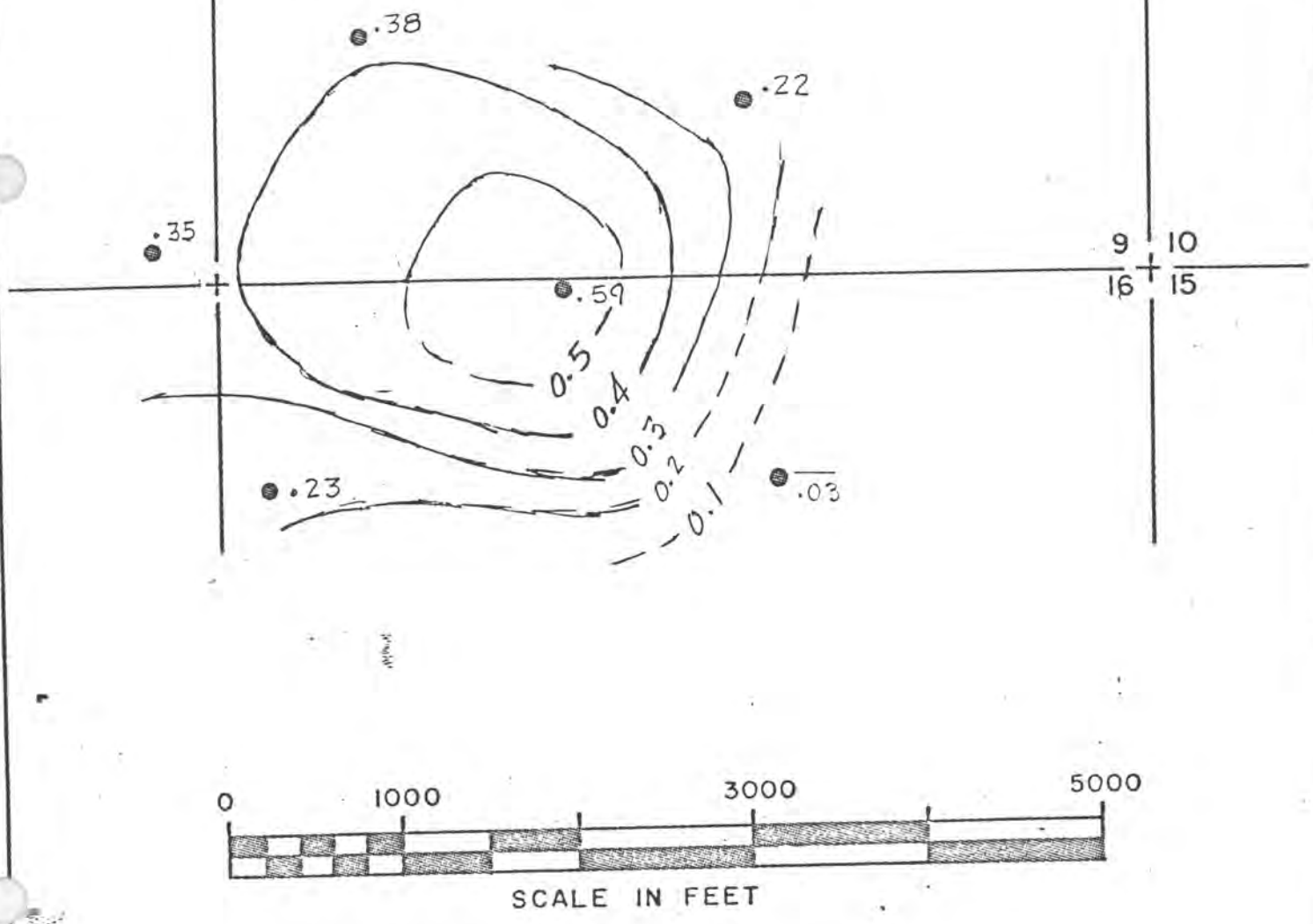
KELVIN PROJECT

T. 4 S., R. 13E.

PINAL CO., ARIZONA

COPPER (EQUIVALENT) GRADE WITH 0.2% CUTOFF



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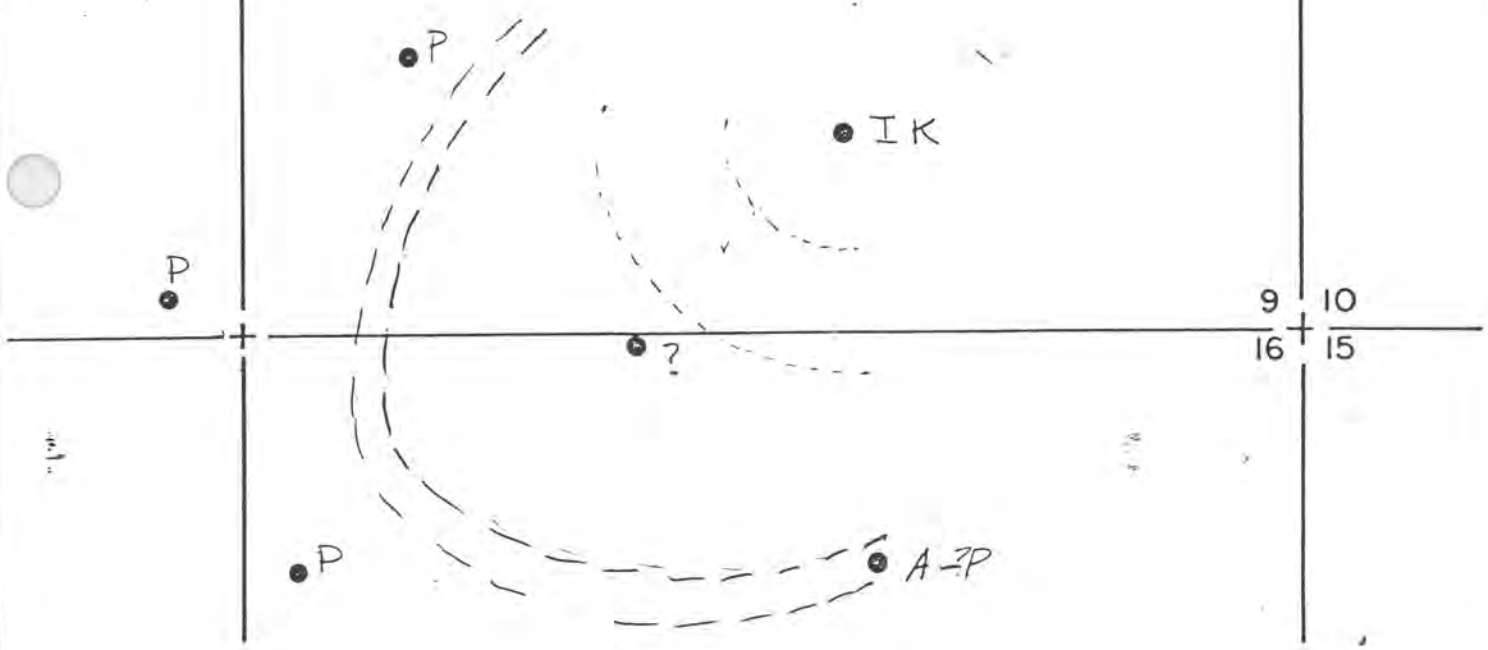
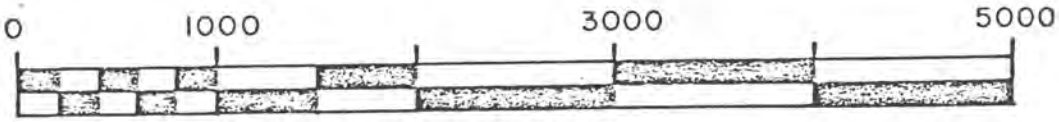
T. 4 S., R. 13 E.

PINAL CO., ARIZONA

ALTERATION BELOW LOWER FAULT





SCALE IN FEET

JULY 1976

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KELVIN PROJECT

T. 4 S., R. 13 E.

PINAL CO., ARIZONA

3000' x 2100' x 135' x .0833 ≈ 71 KK tons
= .5184 cu = .544 cu equiv.

x 4 ≈ 283 KK tons (double each dim)

≈ 160 KK tons (each dim x 1.5)

283 KK tons = .544
532 KK tons = .401
1,216 KK " = .256 — #3.8 B @ 70°

160 KK tons = .544
300 KK " = .401
685 KK " = .256

135'
253'
580'

71 KK tons = .544 — #541 M @ 70°
133 KK " = .401
304 KK " = .256

2100'

3000'

9 | 10
16 | 15

0 1000 3000 5000

SCALE IN FEET

JULY 1976

J. P. VROMAN

KELVIN

	1	2 % Cu	3	4 % Mo	5	Equiv. Copper	7	interc
2370-2380	J4	.4174		.0126		.4804		110
2300-2480	J4 -	.3512		.0108		.4052		180
2300-2580	J4	.2836		.0104		.3356		280
1930-2050	J5	.5236		.0050		.5486		120
1930-2210	J5	.3334		.0048		.3572		280
1930-2100	J1	.6573		.0012		.6633		170
1740-2100	J1	.3893		.0021		.3998		360

J1-J4-J5 model - radius = 1800' } 262,951,900 ≈ 263 KK tons
thickness = 310'

360 × .3998 = 143.928
280 × .3572 = 100.016
280 × .3356 = 93.968
920 $\boxed{337.912}$ = 0.3673% cu eq

110 × .4804 = 52.844
120 × .5486 = 65.832
170 × .6633 = 112.761
400

or ~~113,100,00~~ 113 KK ton = .5786

AMPAD EFFICIENCY, LINE No. 4636

AMPAD EFFICIENCY LINE NO. 6636

KELVIN. DRILLING DATA: 21J

HOLE #	1 TOTAL LENGTH	2 C.S.M.C. LENGTH	3 $/ft	4 total $	5 ft/shift	6	7 direct drilling	8 mud, add. water	9 casing, hourly mob. etc.	10 assay	11 splitting	12 Thin sec.	13
							per/foot						
J1	2478	2478	13.24	32,809	12.8		$ 9.61	$ 1.48	$ 1.34	$ .73	$.—	$ .08	
J2	3014	3014	15.10	45,511	13.0		10.86	.92	2.45	.61	.22	.06	
J3	3004	3004	14.86	44,639	18.3		12.49	1.29	—.→	.71	.32	.05	
J4	3104	2513	17.67	44,405	17.7		13.73	.83	1.60	.87	.59	.05	
J5	2825	1425	22.72	32,376	18.5		14.07	1.89	5.18	1.08	.36	.14	
J6	2590	2590	18.12	46,931	16.8		13.10	1.03	2.80	.88	.23	.08	
TOTAL	17,015	15,024		246,671									
AVERAGE	2836	2504	16.42	41,112	15.6		$ 12.15	1.18	1.95	.78	.28	.07	
								15.28			1.13		

Rock	% Pheno.	Phero size	Phenocrysts (dec. abund) →					color	groundmass
Tql	10-40	0.3-4.0	qtz	plag.	sanad	biot	magnet	white-cream	K-spar-qtz-plag-mag-apat-sor.
Tah		0.5-3.0	hnbld.				1.0	med. dark gray	plag-mag-pyrox.-K-spar-qtz, antig-al
Tr_2	50	0.3-6.0	plag	qtz	biot	hnbld	0.4	yel-med gray	K-spar-qtz + plag-qtz biot-hnbld
Tr	10-30	1.0-4.0	plag.	biot	hnbld	magnet	qtz	med. lgt gray — it alluv gr.	same + K-spar & apatite
Ttca		0.2-6.0					0.3	grayish or pink	
Ttc		6-12	feld	qtz			0.5		K-spar, plag, biot hnbld. magnet.
TKmr	20-30	0.5-10	plag	qtz	biot	hnbld	high	dark gray	same + K-spar (abund) & sor
TKrh	1-30	1-4	plag.	hnbd	qtz		3.9%	it dark gray	plag hnbld mag K-spar

30

THE KELVIN PROSPECT
PINAL COUNTY, ARIZONA

A SUMMARY GEOLOGIC REPORT

for

CITIES SERVICE MINERALS CORPORATION

by

JAMES P. VROMAN

TUCSON, ARIZONA

LOCATION

The Kelvin Prospect is located in the northern portion of the Tortilla Mountains, Pinal Co., Arizona. Tucson is 60 miles south of the prospect and Phoenix is 67 miles to the west-northwest (figure 1). The prospect is situated within the Ray-Sacaton structural belt which bisects Pinal County. This belt has been defined by Schmidt (1971b) on the basis of elongate intrusive masses of intermediate composition, numerous easterly trending near-parallel dike swarms as well as similar trending mineralized fissure veins and limonite coated fractures. Features of economic interest within this structural belt include Kennecott's Ray Mine, Conoco's Poston Butte deposit and ASARCO's Sacaton Mine. Getty Oil and Hanna Mining have recently announced a significant discovery as the result of a joint venture exploration program along the west-southwest extension of this trend.

BACKGROUND

The Kelvin Prospect had been explored by several companies prior to C.S.M.C. interest in the property. During 1968-1969 Minbanco drilled nine hammer holes (total footage=7820 feet). During 1969-1970 Tipperary Resources Corporation geologically mapped the prospect at a scale of 1 inch equals 200 feet; conducted a detailed induced polarization-resistivity survey and drilled two rotary holes (1400 and 1625 feet). During early 1972 Cyprus Mines drilled a 2500 foot angle core hole on the property. Kerr-McGee drilled one 500 foot core hole in 1973. Several other major companies have made surficial geologic examinations of the prospect area over the past several years.

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

J. P. VROMAN 11/75

FIGURE 1

Cities Service Minerals Corporation has controlled the property from mid-1974 until the present time. During that time they have drilled six holes (total footage=14,063 feet core plus 960 feet rotary); conducted a gradient array induced polarization-resistivity survey over a portion of the property; and sponsored a multi-element geochemical study of the +3.3 specific gravity fraction of composite sample pulps.

Most of the available core has been studied in detail (including the Cyprus and Kerr-McGee core). Approximately 12,300 feet of core has been graphically logged at a scale of 1 inch equals 20 feet. The relative amounts as well as the mode-of-occurrence of over a dozen minerals associated with hydrothermal alteration-mineralization have been routinely recorded. The core study has been supplemented by petrographic examination of over 300 thin sections. Assays for several elements have been obtained from split portions of the core. Using all the information, described immediately above, summary geologic logs at a scale of 1 inch equals 100 feet have been prepared.

A list of all the pertinent factual data developed to date is included as an addendum to this report.

LITHOLOGY

The predominant rock unit at Kelvin is the Precambrian Ruin (Oracle) Granite. The Ruin infrequently contains schlieren, some of which may be inclusions of schist and/or diorite. The Ruin is intruded by Precambrian Diabase, Cretaceous(?) intrusive breccia

and by at least five varieties of porphyritic rocks, generally granodioritic in composition, inferred to be of Tertiary-Cretaceous (Laramide) age.

STRUCTURE

Regional geologic studies indicate that the prospect area may have undergone significant eastward tilting since Laramide time. Estimates of the amount of tilting ranges from 30 degrees to approximately 90 degrees.

A shallow dipping fault has been intersected by holes J1-J6 and KE-1 (Otego Fault). This fault is possibly related to the major westerly dipping low angle fault mapped by Creasey, Peterson and Gambell (1974) in the Teapot Mountain quadrangle to the north. There is conflicting evidence concerning the age of the fault (pre-mineral vs. post-mineral). The direction and amount of movement between the hanging wall and the footwall rocks is not well understood.

Additional structures may be inferred from the available subsurface data.

ALTERATION

Above the Otego Fault alteration generally varies from weak to strong propylitic. Below the fault alteration is generally sericitic and potassic. Many of the rocks in the prospect area have apparently been overprinted by late-stage propylitic alteration.

MINERALIZATION

Hypogene copper mineralization in the form of chalcopyrite

occurs within a 400 foot to 600 foot wide zone that appears to be spatially related to the boundary between sericitic alteration and potassic alteration assemblages. The most intense copper mineralization encountered to date is (re. figure 2):

Hole	From	To	Width	%Cu	%Mo
J1	1930	2100	170'	.625	.0012
J4	2370	2480	110'	.412	.0127
J5	1930	2050	120'	.425	.0036
	Mean		133'	.507	.0051

The apparent relationship of the mineralized zone to the alteration zones and to the Otego Fault is illustrated by figure 3.

CONCLUSIONS

1. The work by Cities Service Minerals Corporation has resulted in the discovery of a porphyry copper sulfide system.

2. A 400 foot to 600 foot wide zone of increased copper mineralization dips approximately 25°N15W. The zone apparently terminates against a low angle fault to the south. The zone becomes weaker and thinner to the east.

3. The dimensions of the sulfide system and the associated copper zone are not yet known.

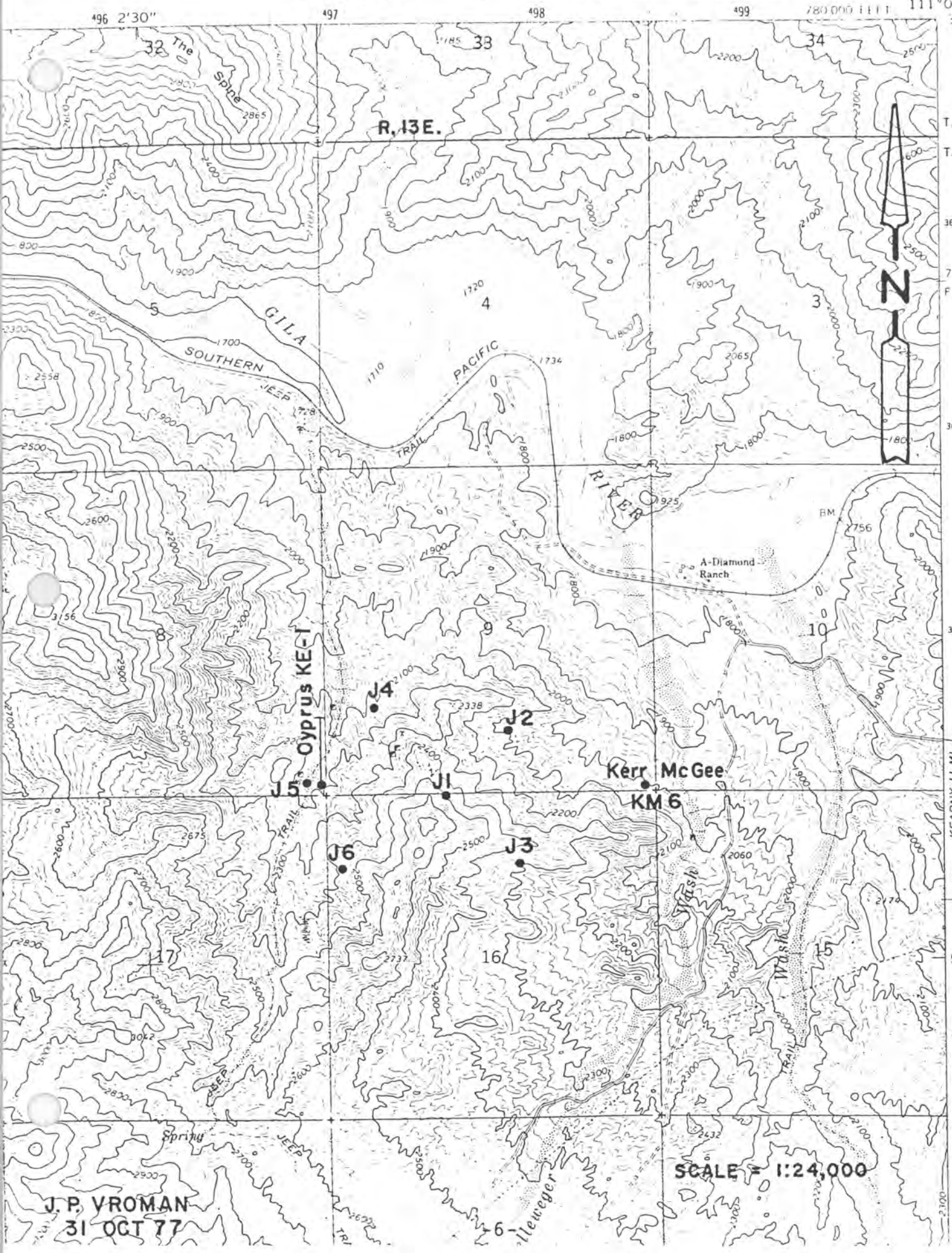
4. Drilling to the east or the south (to depths of at least 3000 feet) of the present drilling will likely lead to disappointing results.

5. Several lines of evidence indicate that additional drilling to the northwest, west and/or north of the present drilling may

KELVIN PROJECT

FIGURE 2

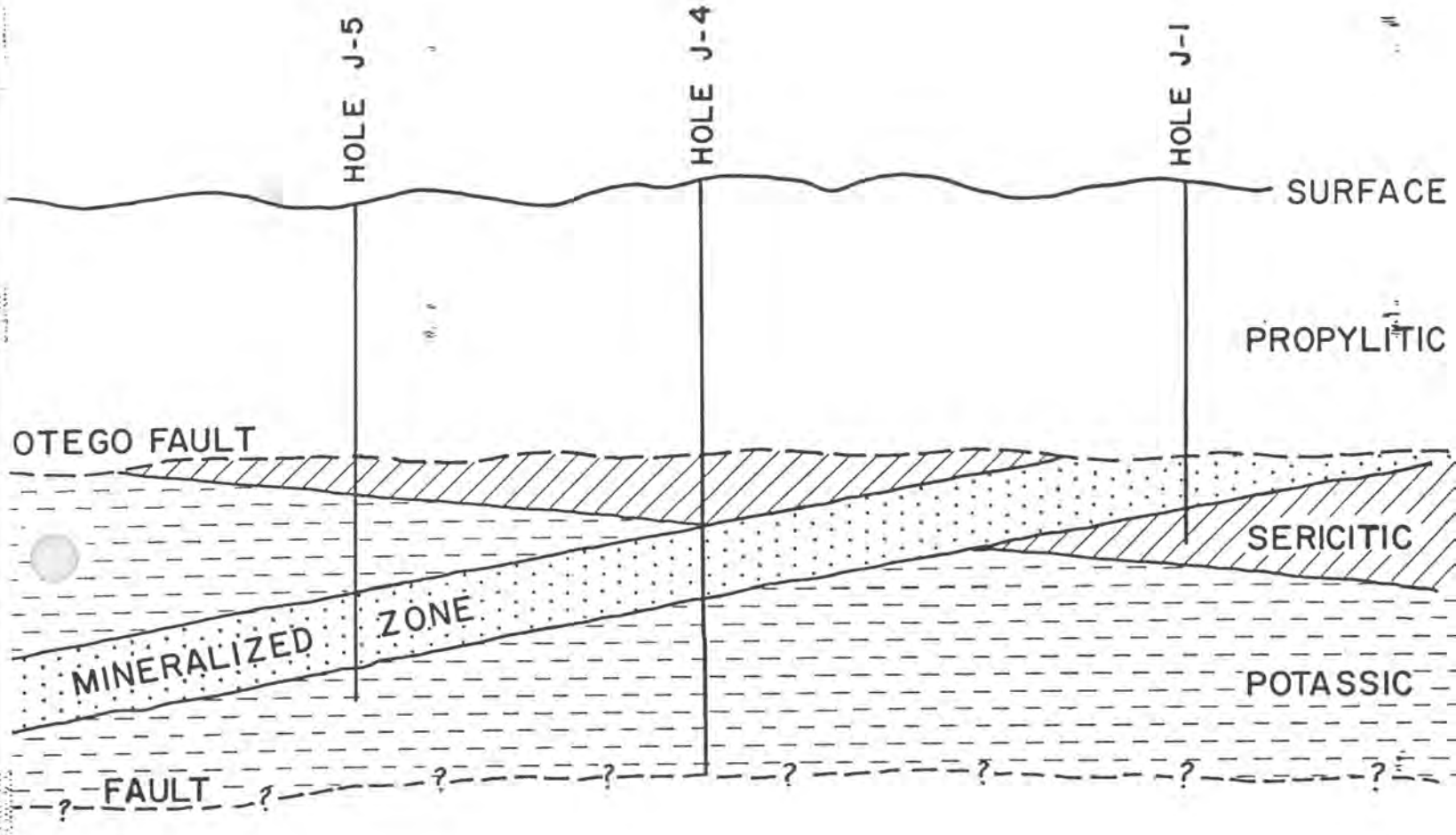
GRAYBACK QUADRANGLE
ARIZONA–PINAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



FILE NO.

CITIES SERVICE MINERALS CORPORATION

SCALE none
DATE 31 Oct 77
DRAWN BY Vroman



KELVIN PROJECT
GENERALIZED SECTION
LOOKING NORTHERLY

TITLE FIGURE 3 SKETCH NO.

result in intercepts of ore-grade material over mineable widths.

6. Cities Service Minerals Corp. would have completed additional drilling on the project if the decision to discontinue minerals exploration had not been made.

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Zelinski, William P., 1973, Geologic Evaluation of the Kelvin Copper-Molybdenum Prospect, Pinal County, Arizona, New Mexico Institute of Mining and Technology M.S. Thesis.

ADDENDUM

CITIES SERVICE MINERALS CORPORATION

KELVIN PROJECT - PINAL CO., ARIZONA

LIST OF MATERIALS AVAILABLE FOR REVIEW

SURFACE GEOLOGY MAPS

U.S.G.S. Map GQ-1206 Scale: 1"=2000'
E. H. Schmidt Ph.D. Dissertation Scale: 1"1000'
W. P. Zelinski M.S. Thesis Scale: 1"=200'

DRILL HOLE RECORDS

KE-1 (1254'-2500')	
KM-6	Logged by C.S.M.C.
J1	Detailed logs at 1"=20'
J2	Summary logs at 1"=100'
J3	
J4	Skeleton samples available
J5	
J6	

Miscellaneous copies of logs of holes drilled and logged by others (pre-1974)

PETROGRAPHY

Petrographic reports on over 300 thin sections obtained from core samples from the drill holes.

GEOPHYSICS

Dipole-Dipole Induced Polarization-Resistivity Survey of Sections 8, 9, 16, 17, T.4S., R.13E.
Frequency Domain (0.3-3.0 Hz), a=1000', n=1-6, along North-South lines spaced 1000' apart.

Gradient Array Induced Polarization-Resistivity survey of S½, Sec. 16, T.4S., R.13E.
Time Domain, a=500', Δ=5000'

GEOCHEMISTRY

The following assay data is available:

elem \ hole	KE1	KM6	J1	J2	J3	J4	J5	J6
Cu	X	X	X	X	X	X	X	X
Mo	X	X	X	X	X	X	X	X
S	X	X	X	X	X	X	X	X
Zn	X	X	X	X	X	X	X	X
Co	X	X				X	X	X
Ag	X					X	X	
W						X		
Fe_3O_4*	X		X	X	X	X	X	X

* "apparent % magnetite" determined by magnetic susceptibility meter

Interpretive report concerning the distribution of 16 elements in the +3.3 g/cc fraction from holes J1, J2, J3, J4, J5, J6 and KM6.

MISCELLANEOUS

Reports, diagrams and sketches illustrating the geology, alteration and structure present in the prospect area.

Drill Summary for Drill Hole J-7

Kelvin Project - CAP No.61-94

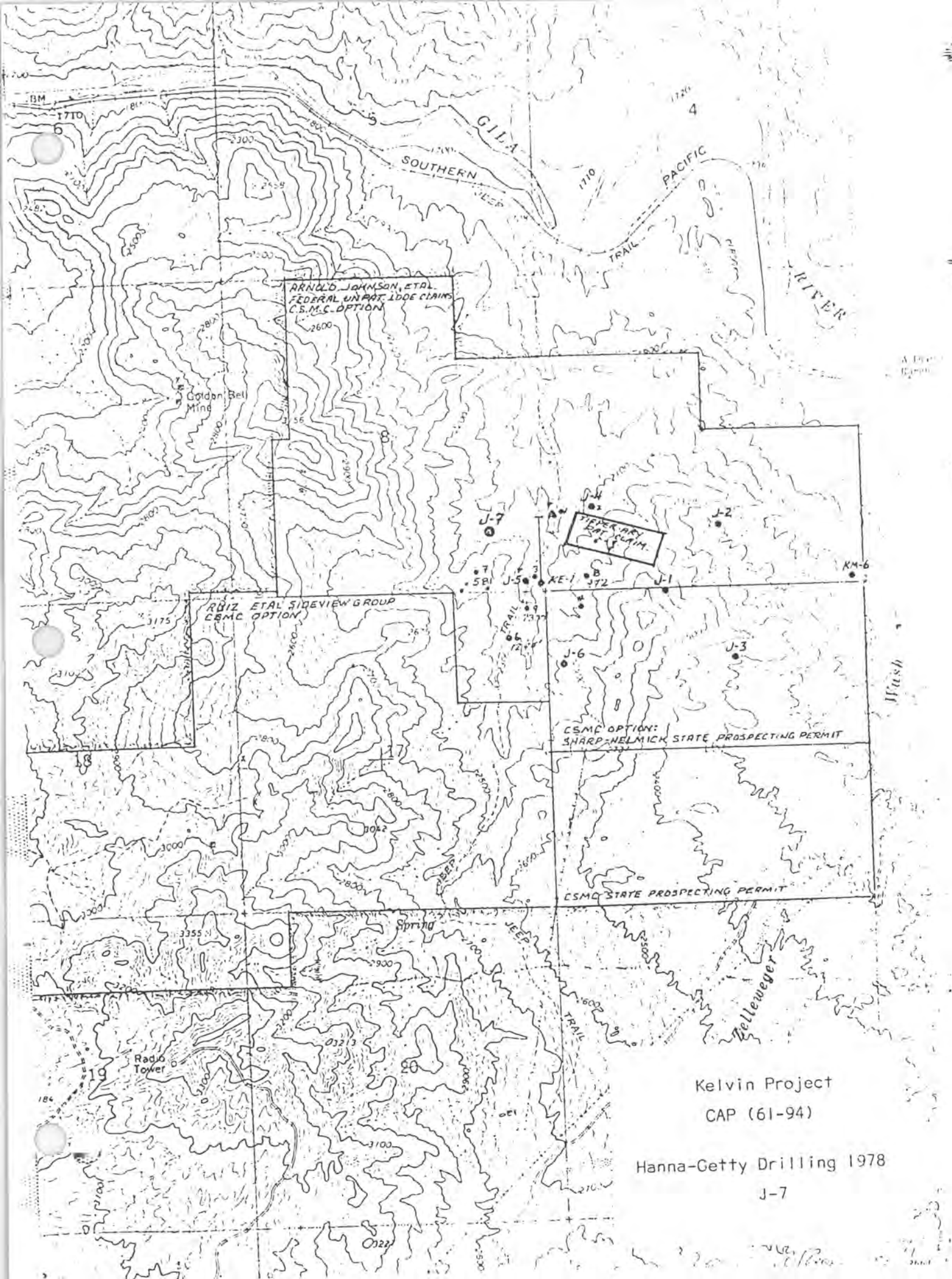
Drill hole J-7 was collared in Ruin Granite of Precambrian age. Between the collar and total depth at 2659' drilling intersected three discernible zones of alteration and mineralization developed in a variety of intermediate intrusive lithologies, as well as andesite and diabase, and apparently separated by broad zones of strong deformation.

The first zone from 0' to 600' consists almost entirely of coarse grained Ruin Granite in which all feldspars show slight clouding but crystal forms are retained. Calcite is present as thin veinlets and clear, possibly secondary, biotite is associated with one to three percent very fine grained magnetite. Chlorite and sericite are confined to zones of fracturing and shearing. K-feldspar is also seen to form diffuse veinlets suggestive of secondary origin. Total sulfide content is less than 1% but the pyrite: chalcopyrite ratio is on the order of 1:1. Copper grade for this zone was approximately 0.02% and molybdenum content ranged from 2 to 12 ppm.

The first zone is separated from the second by a zone of strong shearing which extends from 600' to about 730'. The interval from 600' to about 1450' which comprises the second zone also consists of Ruin Granite interspersed with a variety of intermediate intrusive lithologies, as well as andesite, diabase and a variety of porphyritic rocks. Feldspars are typically lightly argillized to lightly sericitized but some K-feldspar has a texture suggestive of secondary formation as does biotite which varies from very clear to strongly chloritic. Carbonate veinlets are noted and diabase is consistently strongly chloritic. Diabase also shows consistently stronger development of sulfides than do the other lithologies. Copper values range as high as 0.1% and molybdenum content of 160 ppm are noted

but both elements average less than 0.05% and less than 10 ppm respectively. Total sulfides in the second zone were 1% or less and typical pyrite: chalcopyrite ratios were on the order of 5:1 to 8:1. Strong shearing was noted from about 1450' to about 2000' and appears to separate the lower two zones of mineralization. Rocks in the interval between 1450' and TD at 2659' include granite as well as intermediate lithologies but relatively small amounts of andesite and diabase. Ruin Granite is typically very coarse but with a faded granitic texture often showing very clear, clean feldspar grains as well as clear secondary biotite. Porphyritic rocks show evidence of weak development of secondary K-feldspar and biotite but also contain strongly chloritized biotite. Copper values average less than 0.05% and although molybdenum content averaged less than 50 ppm occasional intercepts of 150 to 160 ppm were noted. Total sulfide was 1% or less but the pyrite:chalcopyrite ratio was 1:1 to 1:2.

In general, the silicate alteration assemblege for the J-7 rocks superficially resembles potassic alteration but actually has strong propylitic affinities characterized by a quartz-illite-chlorite-K-feldspar and epidote assemblege as noted in thin section. Alteration zoning on the whole is poorly developed and tends to suggest the presence of a relatively weak hydrothermal system.



Kelvin Project

CAP (61-94)

Hanna-Getty Drilling 1978

J-7

SUMMARY OF DRILL PROJECT

Project: Kelvin (61-94) Kearney, Arizona

Date: August 14, 1978 - November 14, 1978

Type of Drill: Diamond drill - Joy-22 - hydro stat

Contractor: Joy Manufacturing Co., Tucson, Arizona

Total Cost: $51,036.76 Mud cost $8,122.14 - .159% ($42,914.62 - .189%)

Footage Drilled: 2,659 feet @ $19.194 cost per foot

Number of Holes: J-7, 2,659 feet

Summary: The drill hole was started with NX and finished NX size. Lost circulation at 1,008 feet and the hole started making water at the rate of +3-5 gal. water per minute. Had one twist off at 1,385 feet. Hole was left with 20 feet of NX casing with threaded cap.

PROJECT KELVIN - CAT PAGE 1
D.D.H. No. J-7 SCALE 1"=10' BY [illegible]
LOCATION — COLLAR EL 2175' DATE 11-9-78

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo

0 [illegible]

10

20 [illegible], rare Qtz Vn; yell-or FeOx? along fractures 30°-80° w/H.Axis; minor shattered sections

25%

30 30-34 Lt. ol. gr 5Y 5/2 Diabase; mostly shattered pcs, hematite along fractures. 34-187

7% 2.5/4 4.5/1

Pink gray 5 YR 8/1 to Lt. bl. gr 5B 7/1

40 Granite. Composition

Orthoclase - 60-70% Rum
Plagio. 30 % Gr.
Biotite 5-10 % Yr
Magnetite(?) 1-2%

3.5/5

40 50 100 2(1)

11% 4/5

50 Alteration: Generally rock: clay and occasional carbonates along fractures

58% 10/10

60 shear/gouge zones: 28-29
34-36
38-39
47-48
66-67
70.5-71
83-89
147-149
185-187.

29% 4/4 3/3 4.5/5

90

34% 4/5

80

4.5/5.5

18% 3.5/3.5

shear angles:
80% - 70° to 80°
20% - 20° to 60°

90

57%

100

PROJECT _____ PAGE _____
D.D.H. No. _____ SCALE _____ BY _____
LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type
5/5				
5/5				
5/5				
5/5				
5/5				
10/10				
5/5				
5/5				
10/10				
10/10				
10/10				
5/5				
5/5				
10/10				
5/5				
5/5				

100

Bt - forms as clots, normally slightly magnetic suggesting fine magnetite dust in the clots. Clots also typically salt & pepper texture but occasionally goes 1" to 2" across

110

Orthoclase - pinkish yellow fresh to slightly cloudy.

Chalcopyrite occurence
41' - w/ Bt clot ½" across
174' - 175' as vn/t with py. and Bt
Py : cpy = 1:1
TS < 1%

120

Sericite occurs rarely in some of the fractures (e.g. 176')

Oxidation appears to terminate at 115'

130

140

150

160

170

180

190

200

CORE ASSAYS				
INTERVAL		MINERAL		
FROM	TO	Cu	Mo	
100	152	60	80	
170	180	130	6	

PROJECT _____ PAGE _____
D.D.H. No. _____ SCALE _____ BY _____
LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
5% 10/10								
32% 8.5/9								
31% 4.5/7								
46% 4/5								
43% 4/8								
43% 10/10								
36% 1.5/2								
53% 10/10								
47% 10/10								
56% 8/8								

190 - 330

Ruin Granite

Color ranges from greenish gray (5 G 6/1) to light bluish gray 5 B 7/1

Alteration:

= Most noticeable - abundance of magnetite (fine dust + clots) 1-3%

= magnetite and biotite (secondary) occurring together in clots and occasionally in veinlets. Biotite approx 5-10%

= Carbonate normally occurring as thin veinlets throughout the section; especially along fractures

= Sec (?) K-Feldspar abundant as blebs and veins/veinlets

= Primary? K feldspar retains crystal boundary.

= Most plagioclases cloudy although still showing distinct crystal forms

= Chlorite common only at or near shear / fault zones

= TS < 1% - pyrite/cpy = 1:1

FROM	TO	Cu	Mo
240	250	380	8
280	290	100	<2

PROJECT Kelvin PAGE 2
D.D.H. No. H-7 SCALE BY
LOCATION COLLAR EL DATE

% Core Recovery	Mineralztn	Alteration	Structure	Rock Type
10/10				
67%				
10/10				
74%				
10/10				
25%				
3.5/5				
7/7				
78%				
8/8				
48%				
5.5/6				
10/10				
64%				
8/9				
64%				
9.5/10				
65%				
10/10				
58%				
10/10				
65%				

300

Shear & fault zones at the following:

182'- 183' 45°
203'- 207' 60°
225'- 230' 45°-60°
248 - 250' 10°- 60°
254'- 267' 45°-60°
280'- 284' (?) - 50°
300' - 20° (?)
324' - 333' 10°- 45°

310

320

330

330- 470

Pink Granite - same as 190'-330'; probably more Bt & mag.

shear and fault zones

333' 45°.
384'- 390' 60°.
415'- 420' 45°- 60°
427'- 429' 60°

TS < 1% !

340

350

360

370

380

390

400

CORE ASSAYS

INTERVAL FROM	INTERVAL TO	MINERAL Cu	MINERAL Mo		
320	330	150	2		
380	390	35	2		

PROJECT Kelvin PAGE 5

D.D.H. No. V-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type	Depth	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
8/8 31%					400						
7/7 18%					410						
3/2 3/3											
10/10 83%					420						
5.5/6 64%					430						
9/9 59%					440						
7/7											
7.5/8 73%					450						
10/10 78%					460						
10/10 58%					470						
10/10 70%					480						
10/10 85%					490						
					500						

470-604

RUIN GRANITE - QTZ MONZ - LT. GRAY N7 TO LT. GREENISH GRAY 5GY 8/1 TO PINKISH GRAY 5YR 8/1 - VERY COARSE GRANITIC TEX. K-SPAR SUBHEDRAL W/ SLIGHTLY HAZY BORDERS. K-SPAR V. CLEAR TO LIGHTLY CLOUDED. BIO. V. CLEAR TO MOD CHLORITIC MOSTLY ANHEDRAL.

PLAG. ANHEDRAL - CLEAR TO LT. CLOUDED.

PROJECT _____ PAGE _____

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type
77% 10/10				
77% 10/10				
85% 10/10				
5/5				
20% 6/6				
53% 7/7				
5½/6				
23% 10/10				
51% 10/10				
39% 10/10				
33% 10/10				
40% 2/2				

500

K-SPAR FORMS OCCAS. V. DIFFUSE POORLY DEVEL UNITS TO 1". BIO, USUALLY CHLORITE NOTED IN OCCAS RAGGED 1/16" VNLTS. W/ MAGNETITE.

510

V. SP BLEBS CPY & DISSEM PY. TOT. SUL <1%

520

PY I = CPY. – SUL ASSOC K-UNITS IN SOME CASES.

EST 0.02% Cu.

530

(AT 524 1" GN V. COARSE CALCITE)

540

550

560

570

580

(584-591 CONC BIO-MAG)

590

600

CORE ASSAYS				
INTERVAL		MINERAL		
FROM	TO	Cu	Mo	
510	510	3.5	12	
590	600	510	4	
6				

PROJECT [illegible] PAGE 7
D.D.H. No. 1-7 SCALE _____ BY _____
LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
10/10					600					
3/3						604-668.5				
2/2					610	RUIN GRANITE · LT. PINKISH - GREENISH GRAY - COLORS SIM TO 470-604 - LACKS TEX - DEF DESTRUC & FADING OF ORIGINAL COARSE GRANITIC TEX.	610	620	9[illegible]	4
6/6										
6/6					620	ALL FELDS CLOUDED - BIO BLEACHED & CHLORITIZED LOCAL DEV. COARSE GREEN SUR & DISSEM SUL				
10/10					630	TOT. SUL <1% PY : CPY >10:1 EST GRADE. 0.02%				
5/6										
3.5/4					640					
3/3										
3/3										
1/2					650					
5/5										
4.5/5					660					
2/3										
5/5										
3.5/4					670	6685-684				
5/5						ANDESITE - LT. GRAY N7 - V. FINE GRAINED - APHANITIC TEX. - SUL V. SP - ABSENT - NOTE OCCAS CARB VNLTS - SOME FENCS SLIGHTLY GREEN W/ TALLY MIN DEVEL.				
4/5					680					
3.5/4						TOP & BOTTOM CONT ST. BROKEN				
3.5/4						684-770				
4.2/5					690	RUIN GRANITE - GREENISH GRAY SG 6/1 · OCCAS PINK CAST DUE K-SPAR - TEX IS V. COARSE GRANITIC BUT HAZY ALL XES SUBHEDRAL & ANHEDRAL				
2.7/3					700					

-7%
24%
20%
10%
1%
19%
0%
12%
4%
8%

PROJECT _____ PAGE 8

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo	
5/5			Δ		700					
4/4			Δ							
0%										
4/4			Δ Δ							
					710					
4.5/5			Δ							
23%			Δ			710	720	140	Z	
5/5			Δ							
					720					
3/3			Δ							
2/2			Δ							
12%										
4/4			Δ							
					730					
4.5/6			Δ Δ							
0%										
4/4			Δ							
3.5/3			Δ		740					
			Δ							
0%										
6.5/8			Δ							
			Δ							
					750					
5/5			Δ							
12%										
3/3			Δ							
			Δ							
4/4			Δ		760					
28%			Δ							
5/5										
12.5			Δ							
3.7/4										
2.8×4"					770					
33%					770 - 841					
5/5										
					RAIN GRANITE. - MED LT. GRAY					
5/5					780 NG - SLIGHTLY PINKISH DUE K-SPAR.					
					TEXTURE IS V. COARSE GRAINED					
5/5					GRANITIC BUT TEX IS HAZY &					
37%					INDISTINCT.					
4.5/5					K-SPAR IS CLOUDED - PLAG.					
					790 IS CLOUDED & SHOWS					
4/5					GREEN SER. BIO IS					
25%										
5/5					THOROUGHLY CHLORITIZED AND					
					800					

PROJECT _____ PAGE 9

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
5/5					800	CARRIES SIGNIF MAGNETITE.				
5/5										
5/5					810					
3/3							810	820	50	2
5/4					820					
5/5										
5/5					830					
5/5										
10/10					840	841-866.5 RUIN GRANITE - VERY LT. GRAY N8 - COARSE GRANITIC TEX BADLY FADED - V. HAZY. ALL IS BLEACHED, CHLORITIZED. ALL FELDS CLOUDED. SULFIDES NIL MAGNETITE V. SPARSE. NOTE SP. QTZ VNLTS & CO_3 VNLTS W/ V. SP MOBILIZATION OF K-SPAR. FRACS STRONGLY GREEN & TALCY W/ HORIZ SLICKS ON 60-70° FRACS.				
5/5					850					
5/5										
5/5					860					
4/4										
5/5					870	866.5-881- ANDESITE - GREENISH BLACK 5GY 2/1 - APHANITIC TO V. SLIGHTLY PLAGIOC. CONTACTS TOP & BOTTOM ARE IRREG & INTRUSIVE AND INTO GRANITE. AND ENCLOSES INCLUSIONS OF GRANITE. NIL SULFIDES - 1/4" CARB VNLTS - TALCY FRACS.				
5/5										
5/5					880	880- RUIN GRANITE - LT. GRAY N7 COARSE GRANITE TEX BADLY FADED. ALL FELDSPARS CLOUDED - BIO CHLORITIZED NIL SULFIDES - SP MAGNETITE ASSOC W/ BIO.				
4/4										
5/5					890					
5/5										
5/5					900					

Margin notes: 30% 41% +1' ? 0.5>4" 23% 36% 21% 37% 53% 57% 59% 38% 9-5-78 43

PROJECT KELVIN PAGE 10
D.D.H. No. U-7 SCALE BY LCA/AAO
LOCATION COLLAR EL DATE

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
0.5/5					900	905 - 950.5 Granite, light greenish gray, most Biot chlorit'd. mag < 2%, CO_3 abund. along fracts, common K-fields veinlets.				
34% 5/5										
5/5					910					
21% 5/5							910	920	1050	23
5/5					920	} And dkc, dark-grey, 5-10% Mag, 2% pyr nil cpy; mag in vnlts w/ CO_3				
40% 3/3						T.S. = <1%				
5/5					930	Py:cpy = 7:1				
5% 4/5						} gougy zone 45°-80°				
3.5/4					940					
14% 5/5										
4/5					950	950.5 - 975 Diabase				
56% 5/5						Dark grey-green, abund CO_3 veinlets, mini-fractures marked by soapy green minerals; vugs filled w/ calcite common				
5/5					960	TS - 3%				
64% 5/5						py:cpy = 3:1	960	970	450	<2
5/5					970	cpy abund. as veinlets.				
3/3						} gougy zone + CO_3				
53% 5/5						980 - 1014 - Granite light gray w/ Typical Rum Granite text; w/ clouded Felds and biot → chlorite (partly)				
3/4					1980					
15% 4/4						gen. fractured prominent structures approx 5°-10°, less prominent 60°-80°				
2.5/3					990					
3.5/4						TS - <1%	990	1000	240	2
14% 3.5/0						py: cpy = 8:1				
					1000					

PROJECT KELVIN PAGE 11
D.D.H. No. U-7 SCALE _____ BY LCA/AAO
LOCATION _____ COLLAR EL _____ DATE 9/11/78

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
3/4					1000	Mag 1-2%				
19% 1.5/2						Noticeably more occurrence of				
1/1						K. Feldspar vults..				
2/2										
2/2					1010	1013 to 1014 fractured rxs				
0.5/1										
1/2										
0.5/1						1014-1017 Feldspar Bt porph dk grey; Felds completely clouded; Bt sec; sec (?)				
14% 0.5/1										
3/3						1017-1070				
4.5/5					1020	Rum Granite, Light grey (N7) to				
4% 4/4						pinkish gray (5YR 8/1)				
1.5/2						Main characteristic ① heavily				
3/4					1030	fractured ② super abundant				
9% 3/3						2nd ary K Feldspar veins				
5.5/6						③ Chlorite commonly occurring;	1030	1040	390	2
						same as alteration after				
					1040	Bt.				
22% 4/4						shear/fault/fracture zone:	1040	1050	410	6
2/2						1017-1018				
5/5					1050	1070-1055 - 60°(?)				
14% 5/5						Magnetite - 1-2%				
						TS - 1%				
4/4					1060	py:cpy = 5:1				
26% 7/7										
5/5					1070	1070-1124				
52% 2/2						Rum granite, N7 to 5YR 8/1,				
3/3						more chlorite than above rum.				
1/1					1080	Sec K. Feldspar vult very common				
1/1						TS - 1%				
4/4						py:cpy = 5:1				
59% 5/5						Mag - 2%				
4/4					1090					
23% 5/5										
					1100					

PROJECT Kelvin PAGE 12
D.D.H. No. J-7 SCALE ____ BY ____
LOCATION ____ COLLAR EL ____ DATE ____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
5/5					1100	Fracture joints:				
10% 2 5/3						1092 - 1096 45°	1100	1110	240	<2
2/3						1100 - 1109 80°-90°				
						1116 - 117 45°				
5/5					1110					
36% 5/5										
5/5					1120					
51% 5/5						1124 - 1133 Diabase; grey; transmed by mag/CO_3 vnlts; abund fine grained Bt. sulphides = <1% almost all py.				
5					1130	Felds-Bt porph (same as 1014-1017)				
39% 3/3						1134.5 - 1200 Light gray Rum Granite, commonly fractured, common CO_3 vnlts and K-Feldspar vnlts; chlorite moderate (after Bt.?) to abundant				
3/3					1140	Mag - 1-2%; TS - 1%				
3/3										
41% 5/5							1140	1150	290	<2
5/5					1150	Py: cpy = 8:1 shears/faults:				
22% 5/5						1134 - 1134.5 45°				
						1135 - 1140 60-80° - gougy				
4/4					1160	1150 - 1153 80°-90°(?)				
39% 3/3						1158 - 1160 80° & 45°				
+ 1.5' >4" 5/5						N.B: More cpy at 1136 - 1142 shears/faults				
5/5					1170	1176 - 60°				
34% 5/5						1181 - 60° carbonate filled open(?) tension(?) fractures generally 20-30°				
5/5					1180					
4/4										
16% 4/4										
4.5/5					1190					
37% 5/5										
					1200					

PROJECT Calvin PAGE 13
D.D.H. No. J-7 SCALE BY
LOCATION COLLAR EL DATE 7/25/78

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
5/5					1200 1217 - 21				
5/5					light orange gray [illegible] – [illegible] pink at 1212 - 1219' where composition is >80% pink K-feldspar, [illegible] still common	1200	1210	[illegible]	2
5/5					1210 py < 1% mag - 2%				
4/4									
					Gr-Bxt contact steep at 35°				
5/5					1220 1219 - 1250				
5/5					Diorite				
4/4					Dark gray diorite characterized by fine to medium grained and elongated biot crystal texture. Carbonate veinlets common				
4/4					1230 TS - <1 (only as veins)				
5/5					1240 mag - 1 - 2%				
5/5					shear planes at 45° - 35° very common.	1240	1250	[illegible]	2
5/5					1250				
5/5					1254 - 1269				
5/5					Rim Granite light pink w/ slight greenish tinge				
5/5					1260 TS - <1 mag <1 shear planes 45°				
3/3									
4/4					1270 1269 - 1292.5				
3/3					Diorite dark gray w/ greenish tinge; highly fractured throughout mm, slickenline (soapstone) abundant				
4/4					1280 TS - 1% py : cpy = 1:3 mag - 2%				
3/3									
5/5					1290				
5/5					1292.5 - 1305 (Hole [illegible]) [illegible] granite light pink to [illegible] greenish fragments 2" - 5", [illegible] [illegible]				
					1300				

34%
22%
25%
38%
49%
33%
22%
11%
0%
6%

PROJECT Kelvin PAGE 14
D.D.H. No. J-7 SCALE BY
LOCATION COLLAR EL DATE

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
5/5					1300	Clear - 70°				
4/4						fine	13[illegible]			
4/4								12[illegible]	[illegible]	46
						1306 - 1378.5				
5/5					1310	Rung Granite Pale pink w/ light green sections				
3/3										
5/5					1320	Rare CO_2 vnlts				
3/3						Mod to abund Chlorite				
5/5						Abund. K feldspars				
5/5						Most feldspars → clay				
5/5					1330	Mag - 2%				
4/4						TS - <1%				
5/5					1340					
5/5										
5/5					1350					
4/4							1350	1360	315	6
5/5					1360					
5/5						Abund [illegible]				
5/5					1370	more K-spar 1370-1378.				
4.5/4.5										
1.5/1.5					1380	1378.5 - 1490				
5/5						Feldspar biotite Qtz porphyry.				
3/3						light - med grey ; occas.				
8/8					1390	K-spar vnlts ; occas CO_3 vnlts				
					1400					

+1.5 core 0'>4"

7%

18%

25%

26%

40%

24%

38%

23%

59%

71%

PROJECT Kelvin PAGE 15

D.D.H. No. _____ SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
9/9					1400	(contd) Magnetite veinlets - common pyrite more abundant at silicified zones	1400	1410	435	<2
8%										
10/10					1410	chlorite occurs along slip planes and in the fault zones				
32%										
7/8					1420	TS - <1%				
42%										
10/10					1430					
31%										
10/10					1440					
31%										
10/10					1450					
22%							1450	1460	440	115
8/8					1460					
0										
8/9					1470					
3/3										
5%										
4.5/4.5										
5/5					1480	Bxin				
.5/5										
0										
3.5/4										
5/6					1490	1490 - 1535 Highly fractured pinkish-grey Rwin Granite				
0										
					1500					

PROJECT Kelvin PAGE 16

D.D.H. No. _____ SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
10/10					1500	Abundant chlorite at fault planes; abund wt						
6% 5/5						Tr any K spar veinlets	1500	1510	160	160		
3/3					1510	TS - <1%						
3/3												
6% 5/5												
3/3					1520							
1/4												
0 1/2												
1/1												
15/2					1530							
5/5 3/4												
-3' core 0' >4"												
8% 2/2.5						1535-1689						
3.5/4					1540	GRANITE - QTZ MONZ MED GRAY NS LOCALLY PINKISH GRAY SYR 8/1						
2/2						COARSE GRANITIC TEXTURE · GENERALLY						
16% 3/3						FADED AND HARD. MOST FELDSPAR						
5/5					1550	CLOUDY AFTER CLEAR GRAINS OF BOTH K-SPAR AND PLAGIOCLASE REMAIN. NOTE OCCAS CLEAR BIO - MOST IS SECONDARY						
4/4						NOTE V. SMALL INCIP. VNLTS K-SPAR	1550	1560	150	28		
21% 3/3						AND CHLORITE.						
5/5					1560	RK ST. FRAC & SLICKENSIDED SURFACES DEVELOP. TALCY SOFTY MIN.						
12% 5/5						SULFIDES V. SP ± 1%						
2/2					1570	(@ 1547 NOTE RND GRN FRAGS GRAN PAR ST. SILICIFIED)						
4/4												
0 4/4												
5/5					1580							
7% 3/3						(V. ST. CONC. K-SPAR @ 1558)						
4/4					1590							
3.5% 3/3												
4/4												
					1600							

PROJECT KELVIN PAGE 17
D.D.H. No. J-7 SCALE ____ BY L.C.A. AND
LOCATION ____ COLLAR EL ____ DATE ____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description
5/5					1600	
5/5						
5/5					1610	
2/2						(1614-1616 MYLONIZED ANDESITE V. DK. GRAY)
5/5						
2.5/3					1620	
4/4						
10/10					1630	
4/4					1640	
4/4						
4/4						(@1649 INCIP K-SPAR VN.)
3.5/3.5					1650	
3.5/3.5						
5/5					1660	
5/5						
4/4					1670	
6/6						
5/5					1680	
3/3						
5/5						
4.5/5					1690	1689-1751.5 GRANITE - QTZ MONZ - LT. GREENISH GREY SG 8/1 - COARSE GRANITIC TEXTURE SHOWS EVIDENCE STRONG CRUSHING AND SHEARING.
4/4					1700	

CORE ASSAYS

INTERVAL FROM	INTERVAL TO	MINERAL Cu	MINERAL Mo		
1600	1610	620	28		
1650	1660	105	4		

25%
14%
0%
4%
14%
22%
0%
31%
47%
67.

PROJECT KEVIN PAGE 10
D.D.H. No. J-7 SCALE _____ BY LCA-AMO
LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
5/5					1700	ALL PLAGIOCLASE SHOWS CLOUDING BY GREENISH TALCY-SERICITE MINERAL				
4.5/4.5						V. SP. SULFIDES - TENN TO OCCUR IN BLEBS W CPY ≥ PY. TOT SUL ±1%.				
2/2					1710					
5/5										
7/7					1720					
3.5/4										
4.5/4.5					1730					
4/4										
3/3.5										
4/4					1740					
3/3.5										
4.5/4.5					1750					
1/1.5						1751.5-1816				
1/1.5						GRANITE - LT. GRAY N7 - SLIGHT PINKISH CAST DUE K-SPAR. VERY COARSE GRANITIC TEX. - SLIGHTLY HAZY & FADED.	1750	1760	140	2
1.5/1.5										
4/5.5					1760					
5.5/6						PLAGIOCLASE CLOUDED SUBHEDRAL K-SPAR GEN CLOUDED - SOME CLEAR FACES REMAIN. BIO STRONGLY CHLORITIZED.				
2/2										
7/7					1770					
5.5/7						SPARSE MAG ASSOC. W/ CHL. BIO. NIL OR ESSENT. NIL SULFIDES.				
3.5/3.5					1780	(ON SPLIT CORE NOTE ABUN V. COARSE V. CLEAR K-SPAR)				
4/4.5										
4/3.5					1790					
2/2.5										
5/5					1800					

2%
3%
3%
+30 CORE .3' >4"
21%
27%
14%
20%
15%
9%
27%

PROJECT Kelvin PAGE 19
D.D.H. No. J-7 SCALE 1"=10' BY [illegible]
LOCATION COLLAR EL DATE

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Core Assays: Interval FROM	Interval TO	Mineral Cu	Mineral Mo
					1800				
33% 5/9						1800	1810	120	16
					1810				
4/4									
10% 3/3									
2.5/3					1820				
1.5/2									
11% 2.5/3									
5/5									
					1830				
25% 9.5/9.5									
					1840				
4/4									
20% 2.5/2.5						1840	1850	90	12
5/6					1850				
16% 3.5/4									
4/4.5					1860				
13% 4.5/4.5									
5/5					1870				
4/4									
20% 2/2									
3.5/3.5					1880				
4/5.5									
4% 4/4					1890				
2/3									
0% 3/4									
3/4					1900				

1816-1865 GRANITE - GRAY GREEN - 5GY 6/1
COARSE GRAINED TCY - HAZY AND
STRONGLY FADED. K-SPAR CLOUDED
PLAG ALT TO GREENISH SER (?)
BIO. STRONGLY CHLORITIZED
MOD MAG ASSOC W/ BIO. V.SP
TO NIL SULFIDES

STRONGLY SLICKENSIDED FAULT CONTACT
DIPS = 60° SLICKS RAKE 0°

1865 - 1882
MONZ POR - DARK GREENISH GRAY
CROWDED SERIATE POR TCX BIO.
STRONGLY CHLORITIC - ANHEDRAL
PLAG. STRONGLY CLOUDED.
NOTE STRONG CLOT PY-CPY
AT 1871.

V.ST BRECCIATED CONTACT
1882-1949.5
GRANITE - GRAY GREEN - COARSE GRAINED
TCX - VERY HAZY AND FADED DUE
ALT. ALL PLAG - EUHEDRAL TO
SUBHEDRAL STRONGLY CLOUDED - K-SPAR
SUBHEDRAL TO EUHEDRAL. GEN CLOUDED BUT
WITH CLOUDS. BRIGHT CLEAR CLEAVED.

PROJECT _____ PAGE _____

D.D.H. No. J-7 SCALE 1"=10' BY R.C.A.

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	Depth	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
12%	7.5/9				1900	BIO. STRONGLY CHLORITIZED	1900	1910	110	28
	2/2				1910	SULFIDES V. SP TO NIL. GRANITE STRONGLY CRUSHED - NO ATTIT. RECOGNIZED.				
19%	4/4									
	2.5/3									
	2.5/3				1920					
0	1/1									
	2/3									
	2/3				1930					
4%	2/3									
	3.5/4									
	3.5/4				1940					
13%	5/5					V. SHARP INT. CONT - DIPS 20°				
	4/5				1950	ANDESITE - MED. LT. GRAY N6 TO MED DK GRAY N7. V.F. POR. TEX. NEARLY APHANITIC - STRONGLY FRAC ALONG VERT. FRACS W/ DEVEL. SCARY TALCY GOUGE. ABUN 1/8" CO_3 VNLTS - SULFIDES NOT NOTED.	1950	1960	265	A
43%	5/5									
	4/4				1960					
13%	4/4					SHARP INT. CONTACT DIPS				
	3.5/3.5					POR. 1962-2017.5 GRANITE - LT. GRAY N7 - COARSE GRANITE TEX BADLY FADED AND HAZY. ALL FELDSPARS APPEAR HAZY BIO. STRONGLY CHLORITIZED. NOTE INCP. VNLTS K-SPAR.				
	4.5/4.5				1970					
4%	4/4									
	2/2.5									
	4.5/4.5				1980	SULFIDE NIL TO ABSENT. (@1964 1/2' POR. - UNMIN)				
0	2.5/3.5					MAG. SPARSE TO ABSENT.				
	3.5/4.5				1990					
28%	4/4									
	4/4				2000					

PROJECT _____ PAGE _____

D.D.H. No. J-2 SCALE 1" = 20' BY R.H.

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
5/5					2000	1998	2018	.35	.14		
5/5					2010 SHARP INT CONT DIP 30°						
5/5					C20.1 NOTE INCLUSION OF PIK DECEIBEN BELOW - SHOWS UPPER CONTACT IRREGULAR. 2017.5-2022 BIO MINE POR - MED GRAY N5 - OPEN SERIATE POR TEX - ANHEDRAL PEAL BLEACHED - SHOWS BIO CLEAR. NO SUL. NOTE UNITS CALCITE & GRAPHITE. DK APPAN CONTAMINATE.						
5/5					2020						
5/5					SHARP INT CONTACT DIP ± 60°						
5/5					2022 - 2049.5						
4/5					2030 GRANITE LT. GRAY to SLIGHTLY PINKISH GRAY N6 TO 5YR 8/1 - COARSE GRANITIC TEX. BADLY FRACD. ALL FELDSPARS CLOUDED - BIO STRONGLY CHLORITIZED IN SOME AREAS V. FRESH IN OTHERS. NOTE VNLTS OF SUL 1/2 & INCR DEVEL K-SPAR. - RK ST. SILICIF.						
5/5					2040						
5/5					SHARP FLAT CONT						
5/5					2049.5 - 2059						
5/5					2050 ANOB. POR - MED GRAY N5 - OPEN SERIATE POR. TEX. ANHED PEAL CLOUDED - BIO SUBHEDRAL V. CLEAR. CALCITE VNLTS 1/8" - 1" APHANITIC GRND MASS APHANITIC. NO SUL. FRACS DEVEL TALCY SHARP FRAC.	2059	2060	.45	.38		
2/2					2060 SHARP CONT DIP 70°						
3/3					2059 - 2181						
5/5					GRANITE. PINKISH GRAY 5YR 8/1 COARSE GRAIN TEX. FRACT. COARSE CLOUDY K-SPAR - PROB.						
3/4.5					2070 2ND K SPAR						
4.5/4.5					ST. QTZ VNING & SILICIF						
5/5					GRAN CONTAINS IRRG. INC. ANH. PUR IN TOP 2' SECTION.						
5/5					2080						
5/5					NOTE V. SP. SULFIDES - LEAD IN DISSEM FORM. PYRITE - 1-1 OR 0.5% BUT TOT ISH. IS << 1%.						
5/5					2090						
4.5/4.5											
5/4.5					2100						

PROJECT _____ PAGE 22

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzm	Alteration	Structure	Rock Type	Depth	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
					2100						
70% 5/5											
1/1											
5/5					2110						
45% 5/5						2110	2120	205	36		
4.5/5					2120						
20% 5/5											
5.5/9					2130						
5%											
1/4					2140						
1.5/2											
21% 3/3											
2.5/2.5											
2/1.5					2150						
2.5/2.5											
0.5/0.5											
29% 4/4						2150	2160	125	4		
2/3					2160						
4/4											
18% 5/5											
5/5					2170						
29% 4.5/4											
5/5					2180						
58% 4.5/4.5											
5/4.5					2190						
37% 5/5											
5/5					2200						

(@2119 NOTE 6" ZONE [illegible] CRUSHED [illegible] BLACK GOUGY ZONE [illegible] L ST. CPY-PY [illegible])

(2129 6" ZONE V. ST PY-CPY IN NEAR VERT. VEINS.)

2181-2204 BIO. MONZ. POR. MED. BLUISH GRAY TO DARK GREENISH GRAY 5GY 4/1 TO 5B 5/1 - STRONG OPEN HIATAL POR TEX DUE BIOTIC.

BIO EUHEDRAL TO SUBHEDRAL GRAINS 1/16" - 1/8" V. CLEAR AND BRIGHT.

PROJECT _____ PAGE 23

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
5/5					2200 GRANODIORITE LOOKS THE SAME THAT PRETENDS IS NEAT INTERMIXED AS K. HARD GRANITE ON TOP.	2200	2210	5'	6		
5/5					2210 CORE SEEMS UNMODIFIED BY GRANITE INTRUSION. HARD IN CUT BY 1/2" VEIN K-SPAR. EXCEPT FINE TREEN K-SPAR IN VEIN ARE FOLLOWING SHARP END OF GRANITE. NO SULFIDES NOTED.						
4/4					2220						
2/2											
4/4											
4.5/4.5											
3.5/4					2230 2204 - 2220 GRANITE - SEE 2059-2181 2220-2226.5 ANDESITE - DK GRAY NB - APHANITIC CARBNTED V. SP PY-CPY IN CO3 INST. FRACS TALCY SHEAR.						
2.5/2.5											
5/5					2240 2226.5 - 2250 BIO. QTZ MONZ - LT. BLUISH GRAY SB 2/1 - OPEN HIATAL POR. TEX. ANHEDRAL PLAG TO 1/4" GEN CLOUDED.						
5/5											
5/5											
5/5					2250 BIO EUHEDRAL - SUBHEDRAL VERY CLEAR! BRIGHT. INCR QTZ - K-SPAR VNLTS. NOTE DISSEM. CPY << 1%	2250	2260	LO	LZ		
5/5											
5/5					2260 PY : CPY 5:1 ALSO NOTE TINY VNLT CO3 - NOT ASSOC SUL. MIN.						
5/5											
3.5/3					2270 2260 - 2344.5 BIOTITE MONZ POR - LT. BLUISH GRAY SB 2/1 - OPEN HIATAL POR TEX.						
5/4											
5/5											
5/5					2280 PLAG TO 1/4" VERY CLEAR - STRIAE VISIBLE - BIO IS V CLEAR SHINY BLACK EUHEDRAL TO SUBHEDRAL - PRIN. MIN PROD. POR TEX.						
5/5											
5/5					2290 NOTE POORLY DEFINED VNLTS ALONG WHICH PLAG APPEARS CLOUDED AND SERICITIZED AND ALONG WHICH V. SPARSE IRREG. K-SPAR IS DEVELOPED. ROCK IS NIL SULFIDES.						
5/5											
5/5					2300 SP. MAGNE						

- 3' core 1.6' >2d

PROJECT _____ PAGE 24

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
					2300				
85% 5/5									
? 5/4					(2307 - K-SPAR VEINING - NO SUL)	2300	2310	185	<2
					2310				
63% 5/5									
5/5									
					2320 (2316 - INCP DEVEL. QTZ - ESPAR CARB VN W/ V SP CLOTTED PY)				
50% 5/5									
4.5/4.5									
4.5/5					2330				
47% 4.5/4.5									
4.5/4.5					2340				
47% 4/4.5					2344.5 - 2349.5 FELDS POR - PINKISH GRAY TO GREENISH GRAY 5Y 8/1 - 5G 4/1 - CROWDED HIATAL POR. TEX - BIO ST CHL - FELDS → GRN SER SP CPY > PY. SOME K-SPAR DEV.				
5/5					2350 2349.5 - 2359 HEMATITIC CHL VEIN - DARK GRN GRAY 5G 4/1 TO GREENISH BLACK 5GY 2/1 - POR TEX CONSIS. OF ANHED PLAG - PARTIALLY DIGESTED IN CHLORITIC GROUNDMASS. ROCK CARRIES 15-20% SPEC. HEM. - V. SP. SULFIDES, MOSTLY PYRITE CHLORITE >50% VOL.				
61% 5/5						2350	2360	25	85
					← CONT. GRAN. OVER 1/2 FOOT.				
5/5					2360 2359-66 FELDS. POR - do 2344.5-2349.5 STRONGLY BRECCIATED. GANGY SECTIONS DEVEL TALLY SOAPY GREEN MIN - NO ATTIT TO SHR. V. SP. DISSEM. SUL MOSTLY PY.				
15% 3/4					2366-2373.5 - do				
3.5/4					2349-2359 - V. ST. SPEC. OCLAS				
					2370 IRREG. CLOTS SUL. MOSTLY PYRITE				
42% 4.5/4.5					← IRREG FAIRLY SHARP CONTACT 60°				
					2373.5 - 2378.5 FELDS. POR - do 2344.5-2349.5 IRREG CLOTS PY-CPY AT LOWER CONTACT.				
5/5					← SHARP CONTACT ±45°				
					2380 2378.5 - 2390.5 " " do 2349.5-2359 IN PART ST. BX W/ IRREG CLOTS PY-CPY AT UPPER CONTACT.				
27% 4.5/5									
4/4									
					2390 2390.5 - 2395 FELDS. POR - do 2344.5 - 2349.5 - BRECCIATED STRONGLY SLICKENSIDED.				
18% 4.5/4.5									
5/5					2395-2400 " " do 2349.5-2359 NOTE 1/4" VNLTS SPEC HEM.				
3/3					2400				

PROJECT _____ PAGE 23

D.D.H. No. J-7 SCALE _____ BY LLP

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
4/4					2400 2400-2407 - FELDS. PCR - Ho 2344.5 TO 2347.5 NOTE PSEUDO BRECCIA TEX				
29% 3.5/3.5					CONT. ST. FRAG.	2400	2410	195	100
					2407-2412 MONZ-(?) GRANODIO - GREENISH GRAY 5G 6/1. LACKS TEX - SLIGHTLY APLITIC - FELDS CLOUDED CHLORITIC - SP PY & SP EPI ON FRAG				
5/5					2410				
57% 5/5					SHARP CONT GO 2412-2420 MONZ-PCR-MED. BLUISH GRAY SB 5/1 - OPEN HIATAL TEX. FELDS ANHEDRAL 1/4" - CLOUDED & COND GREEN SER. SP EPI & PY ON FRAGS.				
5/5					2420				
31% 4.5/4.5					SHARP IRREG CONTACT. 2420-2464 GRANITE - LT. GRAY NT - COARSE GRANITIC TEX - BADLY FADED				
5/5					2430 LOCALLY BRECCIATED AND LOCALLY RESEMBLING BIO MONZ., CONTAINS FREQUENT F.G. BIO. INCLUSIONS				
13% 4.5/5					ALL FELDSPARS CLOUDED BIO. CHLORITIC				
5/5					2440 NOTE POORLY DEVEL K-SPAR - QTZ VNLTS 1/4" VERY SP PY - CPY RATIO UNLESS MAY BE ON ORDER OF 1:1 LOC ST SILICIFICATION				
24% 4/4						2450	2460	660	50
4.5/4.5					2450				
29% 4.5/4.5									
4/5					(@2460 NOTE 1/16" GRAPHITE VEINS)				
2/2					2460 (TOP K-SPAR ALT)				
44% 4/4					2464-2472 BIO MONZ PCR - PINKISH GRAY TO LIGHT BLUISH GRAY SB 7/1 - 5YR 8/1 - OPEN SERIATE PCR. TEX RK ST SILICIF				
5/5					2470 BIO V. CLEAR: CLEAN - MOON ST. K-SPAR FLOODING - SUL. NIL TO ABSENT.				
29% 5/5					2472-2551 GRANITE - LT. BLUISH GRAY - COARSE GRANITIC TEX - BADLY FADED				
3/3					2480 RK ST. SILICIFIED - CARRIES CLEAR CLEAN BIOTITE - FLOODED W/ K-SPAR & CARRIES DK BIOTITIC INCLUSIONS.				
5/5									
35% 5/5					2490 LOCALLY RESEMBLES TEXTURE OF BIO. QTZ MONZ PCR E.G. @2492 AND 2499				
40'>20 5/5									
35% 4/4					NOTE SPARSE VNLTS OF GRAPHITE. RK STRANGLY				
					2500				

PROJECT _____ PAGE 26

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo
22% 4.5/5, 4.5/4.5					2500 SILICIFIED & CUT BY 1/4" QTZ. VEINS. BROKEN AREAS TEND TO BE VERY TALCY & SANDY.	2500	2510	395	14
15% 5/5, 4.5/4.5					2510 SULFIDES < 1% RATIO DIFFICULT TO ESTIMATE VARIES 1:1 TO 3:1 PY-CPY. (@2519 1/16" VNLT MoS2)				
35% 3/3, 4/4, 5/5					2520				
20% 4/4, 4/4			Δ Δ		2530 (2535-2539 - DARK STRONGLY BIOTITIC ZONE - STRONGLY FRACTURED)				
23% 3/3, 9/9			Δ Δ Δ Δ		2540 (2546 - 1' ZONE V.ST BIO)				
39% 5/5, 5/5					2550 2551 - 2659 T.D. BIO. MONZ POR. - LT. BLUISH GRAY HAZY SERIATE POR TEX - LOCALLY RESEMBLES RUIN GRANITE.	2550	2560	315	6
26% 5/5, 5/5					2560 BIO. CLEAR & SHINY - PLAG. IS EUHEDRAL TO SUBHEDRAL - OFTEN ZONED AND GENERALLY CLOUDED				
42% 5/5, 4/4					2570 ROCK IS FLOODED BY QTZ & K-FELDSPAR QTZ VNLTS 7 - 1" NOTED. NOTE SPARSE VNLTS & DISSEM MoS2, GRAPHITE AND PYRITE-CPY.				
56% 5/5, 5/5					2580 TOT. SUL << 1% PY:CPY ON ORDER OF 1:1 OR 0.5:1				
32% 5/5, 5/5					2590 (2550-59 NOTE V.ST FRESH V.F.G. BIO)				
					2600				

PROJECT _____ PAGE 2/

D.D.H. No. J-7 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Depth	Core Assays: Interval FROM	Interval TO	Mineral Cu	Mineral Mo
5/5					2600				
21% 5/5						2600	2610	495	120
5/5					2610				
17% 5/5			Δ Δ						
5/5			Δ Δ		2620				
8% 5/5			Δ Δ						
5/5			Δ Δ		2630				
28% 5/5									
4/0					2640				
5/5									
49% 5/5									
5/5					2650				
18% 5/5						2650	2659 T.D.	410	120
					2660				
					2670				
					2680				

(2600-2610- V. St. Zone
Bio - Slightly Chloritized)

(2618" - Bio inclusion - 2")

(2655 - 1/16" vnlt MoS_2

TD 2659'
11/10/78

J. DAVID LOWELL

CONSULTING GEOLOGIST

Drill Hole No. J-7 Property Kelvin

Type Hole Location

Size Hole Co-ord LCA

Date Started Date Completed

Depth	Sample No.	Cu	Mo	Au	Ag		Description
40'-50'	J-7-1	100	2*				
140'-150'	J-7-2	[illegible]	[illegible]				
170'-180'	J-7-3	130	6*				↑ To skyline 8/23/78
[illegible]	[illegible]						
240-250	J-7-4	240	8				
280-290	5	[illegible]	<2				
320-330	6	100	2				
380-390	7	35	2				
500-510	8	305	12				
590-600	9	810	4				
[illegible]-620	10	90	4				↑ To Skyline Aug 30, 78
710-720	11	140	2				
810-820	12	50	2				↑ To skyline Sept 6/78
[illegible]	[illegible]						
910-920	J-7-13	1050	28				
960-970	J-7-14	450	<2				to skyline 7/11/78
990-1000 ~~1000-1010~~	J-7-15	240	2				
1030-1040	J-7-16	390	2				
1040-1050	J-7-17	410	6				
1100-1110	J-7-18	280	<2				
1140-1150	J-7-19	290	<2				↑ to skyline 7/11/78
1200-1210	J-7-20	135	2				
1240-1250	J-7-21	165	2				
1300-1310	J-7-22	480	46				
1350-1360	J-7-23	315	6				
1400-1410	24	435	<2				
1450-1460	25	440	115				
1500-1510	26	160	160				

* [illegible]

J. DAVID LOWELL
CONSULTING GEOLOGIST

Drill Hole No. J-7 Property

Type Hole Location

Size Hole Co-ord

Date Started Date Completed

Depth	Sample No.	Cu	Mo	Au	Ag		Description
1550-60	J-7-27	150	28				
1600-1610	28	620	28	sp Ct by LCC			10-12-78
1650-60	29	105	4				to Sky line 10/13-78
1700-10	30	490	10				
1750-60	31	140	2				
1800-10	32	120	16				
1840-50	33	90	12				
1900-10	34	110	28	sp Ct by LCC			10/24/78
1950-60	35	265	4			to Sky line	10/25
1998-2008	36	95	14				
20[illegible]-60	37	450	38				
2110-2120	38	205	36	to sky line		11/1/78	AAO
2150-60	39	125	4				
2200-2210	40	55	6				
2250-60	41	60	<2	to Sky line		11/1/78	LCC
2300-2310	42	185	<2				
2350-2360	43	25	85	to sky line		11/9/78	AAO
2400-2410	44	195	100				
2450-60	45	660	50				
2500-2510	46	395	14				
2550-2560	47	315	6				
2600-2610	48	495	120				
2650-2659	49	410	170				

TD = 2659'

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

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Arizona Registered Assayer No. [illegible]

CERTIFICATE OF ANALYSIS

Kelvin

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm							
1	J- 7- 1	100	2							
2	2	60	8							
3	J- 7- 3	130	6							
4	MA- 1	5	4	}	[illegible]	Maris grange				
5	2	5	2							
6	3	20	6							
7	MA- 4	20	4							

TO

PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS:

Trace analysis

CERTIFIED BY:

DATE REC'D.	DATE COMPL	JOB NUMBER
8/23/78	9/19/78	TEV 094

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. [illegible]
William L. Lehmbeck
Arizona Registered Assayer No. [illegible]
James A. Martin
Arizona Registered Assayer No. [illegible]

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm							
1	J-7- 4	380	8							
2	5	100	<2							
3	6	150	2							
4	7	35	2							
5	8	305	12							
6	9	810	4							
7	J-7- 10	90	4							

61-9H

TO
PILLAR - LOWELL AND ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704
Attn.: Mr. J.D. Lowell

REMARKS:
Trace analysis

CERTIFIED BY:

DATE REC'D	DATE COMPL.	JOB NUMBER
8/30/78	9/11/78	TEV 098

SKYLINE LABS, INC.
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Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. [illegible]
William L. Lehenbeck
Arizona Registered Assayer No. [illegible]
James A. Martin
Arizona Registered Assayer No. [illegible]

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm						
1	J-7-11	140	2	Kelvin					
2	J-7-12	50	2						

TO:

PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS:

Trace analysis

CERTIFIED BY:

DATE REC'D	DATE COMPL	JOB NUMBER
9/7/78	9/21/78	TEV 099

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427
William L. Lehmbeck
Arizona Registered Assayer No. 9425
James A. Martin
Arizona Registered Assayer No. 11[illegible]

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm	
1	HK-1- 1	70	<2	
2	2	25	<2	COPPER DICK
3	3	25	10	
4	4	15	2	
5	5	20	2	
6	HK-1- 6	10	<2	
7	J-7-13	1050	28	KELVIN
8	J-7-14	450	<2	

10

PILLAR-LOWELL & ASSOCIATES
5115 N. Oracle Road
Tucson, Arizona 85704

REMARKS: Trace analysis

CERTIFIED BY

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE SIGNED Arizona U.S.A.

DATE REC'D	DATE COMPL	JOB NUMBER
9/13/78	9/25/78	TEV 100

ORTELNE LABS, INC.
P.O. Box 55106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm
1	HK-1- 7	30	<2
2	8	15	<2
3	9	15	<2
4	HK-1- 10	15	<2
5	J -7- 15	240	2
6	16	390	2
7	17	410	6
8	18	280	<2
9	J -7- 19	290	<2
10	HK-1- 11	10	<2
11	HK-1- 12	15	2

TO

PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS
Trace analysis

CERTIFIED BY

REGISTERED ASSAYER
CERTIFICATE NO.
9425
WILLIAM L.
LEHMBECK
Arizona U.S.A.

DATE REC'D	DATE COMPL	JOB NUMBER
9/19/78	10/3/78	TEV 101

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 94
William L. Lehmbeck
Arizona Registered Assayer No. 94
James A. Martin
Arizona Registered Assayer No. 111

CERTIFICATE OF ANALYSIS

ITEM NO	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm
	Return		
1	J-7- 20	135	2
2	21	165-	2
3	22	480	46
4	J-7- 23	315	6
5	HK-1- 15	5	4
6	16 copper	5	2
7	17 Dup	5	2
8	HK-1- 18	5	2

10

PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS:
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE SIGNED Arizona U.S.A.

DATE REC'D	DATE COMPL	JOB NUMBER
9/27/78	9/29/78	TEV 104

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. [illegible]
Arizona Registered Assayer [illegible]

William L. Lehm[illegible]
Arizona Registered Assayer [illegible]

James A. Mart[illegible]
Arizona Registered Assayer [illegible]

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm						
1	HK-1 22	5	<2						
2	23	25	<2	[illegible]					
3	HK-1 24	40	<2						
4	J-7 24	435	<2						
5	25	440	115	Kalum	✓	entered in J-7			
6	J-7 26	160	160						

REMARKS:
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER
CERTIFICATE NO.
9425
WILLIAM L.
LEHMBECK
DATE SIGNED
Arizona U. S. A.

PILLAR-LOWELL & ASSOCIATES
5115 N. Oracle Road
Tucson, Arizona 85704

DATE REC'D:	DATE COMPL	JOB NUMBER
[illegible]	[illegible]	[illegible]

SKYLINE LABS, INC.
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Charles E. Thompson
Arizona Registered Assayer No. [illegible]
William L. Lehmbeck
Arizona Registered Assayer No. [illegible]
James A. Martin
Arizona Registered Assayer No. [illegible]

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm
1	BM-3 1	110	6
2	2	105	4
3	3	90	2
4	4	65	2
5	5	45	<2
6	6	30	<2
7	7	105	<2
8	8	275	<2
9	BM-3 9	40	<2
10	J-7 27	150	28
11	28	620	28
12	29	105	4
13	J-7 30	490	10

PILLAR-LOWELL & ASSOCIATES
1115 N. Oracle Road
Tucson, Arizona 85704

REMARKS
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER
CERTIFICATE NO. 9425
WILLIAM L. LEHMBECK
Arizona U.S.A.

DATE REC'D.	DATE COMPL.	JOB NUMBER
10/13/78	10/23/78	TEV108

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427
William L. Lehmbeck
Arizona Registered Assayer No. [illegible]
James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Zn ppm	Mo ppm
1	J-7- 31	140		2
2	32	120		16
3	33	90		12
4	34	110		28
5	35	265		4
6	36	95		14
7	J-7- 37	450		38
8	BM-3- 10	35	100	2
9	BM-3- 1C	5		2

TO:
PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS:
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE SIGNED Arizona U.S.A.

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
10/26/78	11/2/78	TEV 109

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. [illegible]
William L. Lehmbeck
Arizona Registered Assayer [illegible]
James A. Martin
Arizona Registered Assayer No. [illegible]

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm
1	J-7-38	205	36
2	J-7-39	125	4
3	J-7-40	55	6
4	BM-3-2C	5	<2
5	BM-3-3C	5	2
6	BM-3-4C	1400	8
7	J-7-41C	60	2

TO

PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS:
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER
CERTIFICATE NO. 9425
WILLIAM L. LEHMBECK
DATE SIGNED
Arizona U.S.A.

DATE REC'D.	DATE COMPL.	JOB NUMBER
11/3/78	11/10/78	TEV 111

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
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(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427
William L. Leinbeck
Arizona Registered Assayer No. 9425
James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm
1	J-7- 42	185	<2
2	43	25	85
3	44	195	100
4	J-7- 45	660	50
5	BM-3- 5C	5	<2
6	BM-3- 6C	5	<2

TO

PILLAR-LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS:
Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER
CERTIFICATE NO. 9425
WILLIAM L. LEINBECK
DATE SIGNED
ARIZONA

DATE REC'D	DATE COMPL.	JOB NUMBER
11/11/78	11/28/78	TEV 112

SKYLINE LABS, INC.
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William L. Lehmbeck
Arizona Registered Assayer No. 94[illegible]5
James A. Martin
Arizona Registered Assayer No. 111[illegible]2

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Mo ppm
1	BM-3-7C	5	< 2
2	BM-3-8C	5	< 2
3	BM-3-9C	5	< 2
4	J-7-46	395	14
5	J-7-47	315	6
6	J-7-48	495	120
7	J-7-49	410	170

TO: PILLAR LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

REMARKS: Trace analysis

CERTIFIED BY:

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE SIGNED Arizona U.S.A.

DATE REC'D.	DATE COMPL.	JOB NUMBER:
11/15/78	11/30/78	TEV 113

SUMMARY OF DRILL PROJECT

Project: Kelvin (61-94) Kearney, Arizona

Date: August 14, 1978 - November 14, 1978

Type of Drill: Diamond drill - Joy-22 - hydro stat

Contractor: Joy Manufacturing Co., Tucson, Arizona

Total Cost: $51,036.76

Footage Drilled: 2,659 feet @ $19.194 cost per foot

Number of Holes: J-7, 2,659 feet

Summary: The drill hole was started with NX and finished NX size. Lost circulation at 1,008 feet and the hole started making water at the rate of +3-5 gal. water per minute. Had one twist off at 1,385 feet. Hole was left with 20 feet of NX casing with threaded cap.