CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project MINES EX. INC Line 3 S 0 2 S 1/2 Field date 1-21-67 Data page_____ Comp. date_____. Comp by R.P.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive 1500	-1750 N	12-50 -	1500 →	1000 - 1250 →		→	750 - 1000 →			→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	1A →									→		
(E) Vdc (avg)	103.2	110.8	34.5	109.8	36.5	17.3	109.2	36.7	18.1	10.94		
(F) DCcal	.505											
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15		
(H) ρ dc=ExFxGx10^3/D	39	42	52	42	55	66	41	56	69	83		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	103.2	110.4	34.4	109.2	36.4	17.3	109.2	36.4	18.0	10.92		
(L) AC-DC cal.	1.000											
(M) ρ dc/ρac=ExL/K	1.000	1.004	1.003	1.005	1.003	1.000	1.000	1.008	1.006	1.002		
(N) PFE=(M-1)(10^2)	0.0	0.4	0.3	0.5	0.3	0.0	0.0	0.8	0.6	0.2		
(O) MCF=(M-1)(10^5)/H	0	10	6	12	6	0	0	14	9	2		
S.P.	+2.6	+0.3		-5.2			+0.9					

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
(B) Receive	500 - 750 →			→	250 - 500 →			→		1-2		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	1A →							→		1A		
(E) Vdc (avg)	40.2	18.6	10.9	7.10	17.0	9.88	6.28	4.38		198		
(F) DCcal												
(G) Kn x 10^{-3}	3	7.5	15	26.25	7.5	15	26.25	42.0				
(H) ρ dc=ExFxGx10^3/D	61	70	83	94	64	75	83	93				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	40.2	18.4	10.88	6.96	17.2	9.96	6.34	4.32		198		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.000	1.010	1.002	1.020	.988	.992	.991	1.014				
(N) PFE=(M-1)(10^2)	0.0	1.0	0.2	2.0	-1.2	-0.8	-0.9	1.4				
(O) MCF=(M-1)(10^5)/H	0	14	2	21	-19	-11	-11	15				
S.P.	-1.8				+3.2							

INDUCED POLARIZATION SENDER NOTES

project: Mines Ex Line: 9 Spread 1 N ½ Date: 1 - 23 - 67

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1/2		
Receive	→	→	→	→	→	→	→	→	→	→		
Time		↑										
Range		CAL										
Current	1	1	1	1	1	1	1	1	1	1		
Send	4/5	3/4	2/3	1/2	4/5	3/4	2/3	1/2		4/5 CAL		
Receive	→	→	→	→	→	→	→	→				
Time												
Range												
Current	1	1	1	1	1	1	1	1		1		

INDUCED POLARIZATION SENDER NOTES

project: Mines Ex Line: 9 Spd 2 S½ Date: 1-23-67

Send	4/5	3/4	4/5	2/3	3/4	4/5	½	2/3	3/4	4/5		
Receive	→	→	→	→	→	→	→	→	→	→		
Time												
Range												
Current												
Send	½	2/3	3/4	4/5	½	2/3	3/4	4/5		CAL ½		
Receive	→	→	→	→	→	→	→	→				
Time												
Range												
Current												

INDUCED POLARIZATION SENDER NOTES

project: MINES EX Line: #9 N½ pg. #2 Date: 1/23/67

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1/2		
Receive												
Time												
Range												
Current	1	1	1	1	1	1	1	1	1	1		
Send	4/5	3/4	1/2	1/2	4/5	3/4	1/3	1/2		4/5		
Receive												
Time												
Range												
Current	1	1	1	1	1	1	1	1		1		

INDUCED POLARIZATION SENDER NOTES

project: _____ Line: _____ Date: _____

Send	4/5	3/4	4/5	2/3	3/4	4/5	1/2	2/3	3/4	4/5		
Receive												
Time												
Range												
Current												
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5		CA 1/2		
Receive												
Time												
Range												
Current												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX. INC Line: 3 SP2 5 1/2 Int.Cal _____ Date: _____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		col		
Rec.	500-750	→	→	→	250-300	→	→	→		1-2		
Time	30	30	10	10	30	10	10	10		300		
DC-1	19.6 20.6	9.2 9.4	5.30 5.60	3.78 3.22	8.7 8.3	4.98 4.90	3.62 2.64	2.22 2.16		99 99		
DC-2	19.6 20.6	9.2 9.4	5.30 5.60	3.78 3.22	8.7 8.3	4.98 4.90	3.64 2.64	2.22 2.16		99 99		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	40.2	18.6	10.90	7.10	17.0	9.88	6.28	4.38		198		
AC-1	20.1	9.2	5.44	3.50	8.6	4.98	3.17	2.16		99		
AC-2	20.1	9.2	5.44	3.46	8.6	4.98	3.17	2.16		99		
Σ	40.2	18.4	10.88	6.96	17.2	9.96	6.34	4.32		198		
S. P.	-1.8				+3.2							
AC-N	0.3											
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE_____

Project: MINES EX. INC Line: 3 SO2 N½ Int.Cal_____ Date:_____

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		col		
Rec.	2750 -	3000	→	→	3000 -	3250	→	→		4-5		
Time	100	30	30	10	30	30	10	10		300		
DC-1	28.5 27.5	11.2 13.1	6.2 6.4	4.15 4.26	12.0 12.0	6.4 6.3	3.95 3.74	2.84 2.46		100 100		
DC-2	28.5 27.5	11.2 13.1	6.2 6.4	4.15 4.26	12.0 12.0	6.4 6.3	3.95 3.74	2.84 2.46		100 100		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	56.0	24.3	12.6	8.41	24.0	12.7	7.69	5.30		200		
AC-1	28.0	12.2	6.3	4.22	12.0	6.4	3.85	2.66		100		
AC-2	28.0	12.2	6.3	4.22	12.0	6.4	3.85	2.66		100		
Σ	56.0	24.4	12.6	8.44	24.0	12.8	7.70	5.32		200		
S. P.	+9.0				-10.5							
AC-N	.03				.03							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX. INC. Line: 3 Sp2 S 1/2 Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	1500-1750	1250-1500 →		1000-1250 →		→	750-1000 →			→		
Time	100	100	30	100	30	30	100	30	30	10		
DC-1	50.4 52.8	56.4 54.4	18.5 16.0	56.2 53.6	17.6 18.9	8.0 9.3	56.6 52.6	18.0 18.7	9.6 8.5	5.44 5.50		
DC-2	50.4 52.8	56.4 54.4	18.5 16.0	56.2 53.6	17.6 18.9	8.0 9.3	56.6 52.6	18.0 18.7	9.6 8.5	5.44 5.50		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	103.2	110.8	34.5	109.8	36.5	17.3	109.2	36.7	18.1	10.94		
AC-1	51.6	55.2	17.2	54.6	18.2	8.65	54.6	18.2	9.0	5.46		
AC-2	51.6	55.2	17.2	54.6	18.2	8.65	54.6	18.2	9.0	5.46		
Σ	103.2	110.4	34.4	109.2	36.4	17.3	109.2	36.4	18.0	10.92		
S. P.	+2.6	+0.3		-5.2			+0.9					
AC-N	.02	.02		.02			.03					
Pot.Res.												

AC
DC DD

INDUCED POLARIZATION SENDER NOTES

Project: NINES EX Line: ~~#3~~ #2 N. 1/2 Date: 1/21/67

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1/2		
Receive												
Time												
Range												
Current	1½	1½	1½	1	1	1	1	1	1	1		
Send	4/5	3/4	2/3	1/2	4/5	3/4	2/3	1/2		CAL 4/5		
Receive												
Time												
Range												
Current	1	1	1	1	1	1	1	1		1		

INDUCED POLARIZATION pg. 2 SENDER NOTES

project: MINES FX Line: LINE 3 SW Date: 1/21/67

Send	4/5	3/4	4/5	2/3	3/4	4/5	1/2	2/3	3/4	4/5		
Receive												
Time												
Range												
Current	1	1	1	1	1	1	1	1	1	1		
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5		4/5 1/2		
Receive												
Time												
Range												
Current	1	1	1	0	1	1	1	1		1		

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX. INC Line: 3 SpZ N'/2 Int.Cal _____ Date: 1-21-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec. 1750	-2000	2000-	2250	2250-	2500	→	2500-	2750	→	→		
Time	300	300	100	100	30	30	300	100	30	10		
DC-1	82.0 81.5	76.2 76.2	25.8 25.8	61.8 63.8	19.5 19.1	9.0 9.9	80.0 81.5	25.6 23.0	9.2 11.7	6.24 6.16		
DC-2	82.0 81.5	76.2 76.2	25.8 25.8	61.8 63.8	19.5 19.1	9.0 9.9	80.0 81.5	25.6 23.0	9.2 11.7	6.24 6.16		
Σ												
DC-3	82.0 81.5											
Dc-4												
Σ												
DC-AV	163.5	152.4	51.6	125.6	38.6	18.9	161.5	48.6	20.9	12.40		
AC-1	81.5	76.2	25.8	62.6	19.5	9.4	80.5	24.2	10.55	6.20		
AC-2	81.5	76.2	25.8	62.6	19.5	9.4	80.5	24.2	10.55	6.20		
Σ	163.0	152.4	51.6	125.2	39.0	18.8	161.0	48.2	21.10	12.40		
S. P.	-1.1	-7.4	-16.3				-2.5					
AC-N	.03	.03	.02				.03					
Pot.Res.												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex. Inc Line 1 Sp 1 S20E ½ 150' Field date 7-17-67 Data page_____ Comp. date_____. Comp by R.P.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive	0-125	125-250	→	250-375	→	→	375-500	→	→	→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	2	→	→	→	→	→	→	→	→	→		
(E) Vdc (avg)	942	786	230.5	830	421	159	406	232	157	68.2		
(F) DCcal	.507											
(G) Kn x 10^{-3}	.375	.375	1.5	.375	1.5	3.75	.375	1.5	3.75	7.5		
(H) ρdc=ExFxGx10^3/D	90	75	88	41	160	152	39	88	150	130		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	916	764	228	800	405	153.0	398	228	153.0	67.0		
(L) AC-DC cal.	1.005											
(M) ρdc/ρac=ExL/K	1.033	1.032	1.016	1.042	1.043	1.044	1.024	1.022	1.031	1.022		
(N) PFE=(M-1)(10^2)	3.3	3.2	1.6	4.2	4.3	4.4	2.4	2.2	3.1	2.2		
(O) MCF=(M-1)(10^5)/H	36	43	18	102	27	29	62	25	21	17		
S.P.	-1.2	+0.8		-12.2			-7.1					

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal		
(B) Receive	500-625	→	→	→	625-750	→	→	→		1-2		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	2	→	→	→	→	→	→	→		1		
(E) Vdc (avg)	222	169	134.0	60.0	123.9	106	92.7	43.8		197		
(F) DCcal												
(G) Kn x 10^{-3}	1.5	3.75	7.5	13.125	3.75	7.5	13.125	21.0				
(H) ρdc=ExFxGx10^3/D	84	162	255	199	119	202	308	233				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	216	162	129	58.0	122.4	104.4	91.0	43.4		198		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.032	1.047	1.042	1.037	1.016	1.019	1.022	1.014				
(N) PFE=(M-1)(10^2)	3.2	4.7	4.2	3.7	1.6	1.9	2.2	1.4				
(O) MCF=(M-1)(10^5)/H	38	29	1.6	19	13	9	7	6				
S.P.	+4.2				-26.1							

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex. Inc. Line 1 Sp 1 N20W 1/2 150' Field date 1-17-67 Data page_____ Comp. date_____. Comp by R.P.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	0-125	125-250	→	250-375	→	→	375-500	→	→	→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	2	→	→	→	→	→	→	→	→	→		
(E) Vdc (avg)	756	870	216.5	1296	319	104.5	1298	564	190.0	70.1		
(F) DCcal	.507											
(G) Kn x 10^{-3}	.375	.375	1.5	.375	1.5	3.75	.375	1.5	3.75	7.5		
(H) ρdc=ExFxGx10^3/D	72	83	83	123	121	99	123	214	180	133		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	736	840	212	1274	313	103.8	1280	554	186.0	69.2		
(L) AC-DC cal.	1.000											
(M) ρdc/ρac=ExL/K	1.027	1.036	1.022	1.016	1.019	1.007	1.013	1.018	1.021	1.013		
(N) PFE=(M-1)(10^2)	2.7	3.6	2.2	1.6	1.9	0.7	1.3	1.8	2.1	1.3		
(O) MCF=(M-1)(10^5)/H	37	43	27	13	16	7	11	8	12	10		
S.P.	+2.5	-7.2		-6.7			-7.4					

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal		
(B) Receive	500-625	→	→	→	625-750	→	→	→		4-5		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	2	→	→	→	→	→	→	→		1		
(E) Vdc (avg)	405	289.5	113.0	44.3	192	178	75.5	32.65		197		
(F) DCcal												
(G) Kn x 10^{-3}	1.5	3.75	7.5	13.125	3.75	7.5	13.125	21.0				
(H) ρdc=ExFxGx10^3/D	154	275	216	147	183	339	251	174				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	398	281	110.0	43.6	188	172	73.0	32.0		197		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.016	1.030	1.027	1.015	1.022	1.035	1.035	1.020				
(N) PFE=(M-1)(10^2)	1.6	3.0	2.7	1.5	2.2	3.5	3.5	2.0				
(O) MCF=(M-1)(10^5)/H	10	11	12	10	12	10	14	16				
S.P.	-3.3				-2.5							

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex. Inc. Line: 1 Sp 1 N20W 1/2 (150) Int.Cal _____ Date: _____

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-125	125-250	→	250-375	→	→	375-500	→	→	→		
Time	1000	1000	300	1000	300	100	1000	1000	300	100		
DC-1	378 378	435 435	109 107.5	646 650	161 158	54.0 50.5	650 648	282 282	95.0 95.0	34.3 35.8		
DC-2	378 378	435 435	109 107.5	646 650	161 158	54.0 50.5	650 648	282 282	95.0 95.0	34.3 35.8		
M												
DC-3	378 378	435 435	109 107.5	646 650	161 158	54.0 50.5	650 648	282 282	95.0 95.0	34.3 35.8		
Dc-4												
M												
DC-AV	756	870	216.5	1296	319	104.5	1298	564	190.0	70.1		
AC-1	368	420	106	637	156.5	51.9	640	277	93.0	34.6		
AC-2	368	420	106	637	156.5	51.9	640	277	93.0	34.6		
Σ	736	840	212	1274	313.0	103.8	1280	554	186.0	69.2		
S. P.	+2.5	-7.2		-6.7			-7.4					
AC-N	.02	.02		.02			.02					

INDUCED POLARIZATION - RECEIVER NOTES (150) PAGE

Project: Mines Ex Inc Line: 1 Sp 1 N20°W½ Int.Cal Date:

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2	cal			
Rec.	600-625	→	→	→	625-750	→	→	→	4-5			
Time	300	300	100	100	300	300	100	30	300			
DC-1	202.5 202.5	144.5 145.0	56.8 56.2	22.5 21.8	96.0 96.0	89.0 89.0	38.0 37.5	16.05 16.60	98.5 98.5			
DC-2	202.5 202.5	144.5 145.0	56.8 56.2	22.5 21.8	96.0 96.0	89.0 89.0	38.0 37.5	16.05 16.60	98.5 98.5			
Σ												
DC-3	202.5 202.5	144.5 145.0	56.8 56.2	22.5 21.8	96.0 96.0	89.0 89.0	38.0 37.5	16.05 16.60	98.5 98.5			
Dc-4												
Σ												
DC-AV	405.0	289.5	113.0	44.3	192.0	178.0	75.5	32.65	197.0			
AC-1	199	140.5	55.0	21.8	94.0	86.0	36.5	16.0	98.5			
AC-2	199	140.5	55.0	21.8	94.0	86.0	36.5	16.0	98.5			
Σ	398	281.0	110.0	43.6	188.0	172.0	73.0	32.0	197.0			
S. P.	-3.3				-2.5							
AC-N	.02				.04							

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex Inc. Line: L Sp L 520E (150) Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-125	125-250	→	250-375	→	→	375-500	→	→	→		
Time	1000	1000	300	1000	300	300	300	300	300	100		
DC-1	472 470	394 392	116.5 114.0	415 415	211 210	79 80	204 202	115 117	77 80	32.2 36.0		
DC-2	472 470	394 392	116.5 114.0	415 415	211 210	79 80	204 202	115 117	77 80	32.2 36.0		
Σ												
DC-3	472 470	394 392	116.5 114.0	415 415	211 210	79 80	204 202	115 117	77 80	32.2 36.0		
Dc-4												
Σ												
DC-AV	942	786	230.5	830	421	159	406	232	157	68.2		
AC-1	458	382	114	400	202.5	76.5	199	114	76.5	33.5		
AC-2	458	382	114	400	202.5	76.5	199	114	76.5	33.5		
Σ	916	764	228	800	405	153.0	398	228	153.0	67.0		
S. P.	-1.2	+0.8		-12.2			-7.1					
AC-N	.02	.02		.02			.02					

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Mines Ex Inc Line: L 50 S 20 E (150) Int.Cal Date:

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		col.		
Rec.	600-625	→	→	→	625-750	→	→	→		1-2		
Time	300	300	100	100	100	100	100	100		300		
DC-1	111 111	84 85	67.8 66.2	28.8 31.2	61.5 62.5	54.4 51.6	45.0 47.7	22.1 21.7		98.5 98.5		
DC-2	111 111	84 85	67.8 66.2	28.8 31.2	61.0 63.0	54.6 51.4	45.0 47.7	22.1 21.7		98.5 98.5		
Σ												
DC-3	111 111	84 85	67.8 66.2	28.8 31.2	60.5 63.5	54.6 51.4	45.0 47.7	22.1 21.7				
Dc-4					60.5 63.5	54.6 51.4						
Σ												
DC-AV	222	169	134.0	60.0	123.9	106	92.7	43.8		197.0		
AC-1	108	81	64.5	29.0	61.2	52.2	45.5	21.7		99.0		
AC-2	108	81	64.5	29.0	61.2	52.2	45.5	21.7		99.0		
Σ	216	162	129.0	58.0	122.4	104.4	91.0	43.4		198.0		
S. P.	+4.2				-26.1							
AC-N	.02				.02							

125' 5P1

INDUCED POLARIZATION SENDER NOTES

project: Mines X Jak Line: 1 5 1/2 Date: 1-17-66

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1/2		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		
Send	4/5	3/4	2/3	1/2	4/5	3/4	2/3	1/2		10/45		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2		1		

INDUCED POLARIZATION SENDER NOTES

125 sec

project: Miners Inc Line: N/S Date: 1-17 66

Send	4/5	3/4	4/5	2/3	3/4	4/5	1/2	2/3	3/4	4/5		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5			Col	
Receive											12	
Time												
Range												
Current	2	2	2	2	2	2	2	2			1	

ρdc ×2 MCF ×2 on this spread

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page ____

Project Mines Ex Inc Line 3Sp1 N½ Field date 1/20/67 Data page ____ Comp. date 24 Jan 67 Comp by I. W. L.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	0-250 S	250-500S	→	500-750S	→	→	750-1000 S	→	→	→	1000-	1250S
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg) ②	100.7	132	40.4	1.32	50.0	20.7	136	46.3	25.0	12.22	45.2	21.15
(F) DCcal 1.01 ①	1.0101	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρdc=ExFxGx10^3/D	76	100	122	100	152	157	103	140	189	185	137	160
(I) Vac Σ	100.2	131	40.2	131	49.6	20.6	134	46	24.8	12.16	44.6	21.1
(J) AC noise x 2												
(K) Vac(corr) =$\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.0											
(M) ρdc/ρac=ExL/K	1005	1008	1005	1008	1008	1005	1015	1007	1008	1005	1013	1002
(N) PFE=(M-1)(10^2)	0.5	0.8	0.5	0.8	0.8	0.5	1.5	0.7	0.8	0.5	1.3	0.2
(O) MCF=(M-1)(10^5)/H	7	8	4	8	5	4	15	5	4	3	9	1

Project ____ Line ____ Field date ____ Data page ____ Comp. date ____ Comp by ____

(A) Send	3-4	4-5	1-2	2-3	3-4	-45			Cal			
(B) Receive	→	→	1250-1500S	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→						
(E) Vdc (avg)	13	7.19	17.5	10.18	7.14	4.07						
(F) DCcal	→	→	→	→	→	→			198			
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρdc=ExFxGx10^3/D	197	191	133	154	189	173						
(I) Vac Σ	12.9	7.16	17.4	10.1	7.10	4.04			198			
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) =$\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	→	→	→	→	→	→						
(M) ρdc/ρac =ExL/K	1008	1004	1006	1008	1006	1007						
(N) PFE=(M-1)(10^2)	0.8	0.4	0.6	0.8	0.6	0.7						
(O) MCF=(M-1)(10^5)/H	4	2	5	5	3	4						

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc. Line 3 sp. 15E Field date_____ Data page_____ Comp. date_____. Comp by_____

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-250N	250-500N	→	500-750N	→	→	750-1000N	→	→	→	1000-1250N	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	128.5	99.6	40.25	111.8	38.4	20.2	97.0	34	16.2	10.10	28.25	15.05
(F) DCcal	1.0101	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρ dc=ExFxGx10^3/D	97	75	122	85	116	153	73	103	123	153	86	114
(I) Vac Σ	128	99.4	40.2	111.4	38.4	20.1	96.2	34	16.2	10.12	28.3	15.0
(J) AC noise x 2	→	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	1.0	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1004	1.002	1.001	1004	1.000	1.005	1008	1.000	1.000	.998	.998	1003
(N) PFE=(M-1)(10^2)	0.4	0.2	0.1	0.4	0	0.5	0.8	0	0	-0.2	-0.2	0.3
(O) MCF=(M-1)(10^5)/H	4	3	1	5	0	3	11	0	0	-1	-2	3

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2						
(B) Receive	→	→	1250-1500N	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→						
(E) Vdc (avg)	8.82	6.0	13.275	8.86	5.5725	4.105						
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	1.5	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	134	159	101	134	148	174						
(I) Vac Σ	8.82	5.98	13.1	8.88	5.56	4.1						
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	→	→	→	→	→	→						
(M) ρdc/ρac =ExL/K	1.000	1003	1013	.998	1.002	1001						
(N) PFE=(M-1)(10^2)	0	0.3	1.3	-0.2	0.2	0.1						
(O) MCF=(M-1)(10^5)/H	0	2	13	-2	1	1						

5 ender all 1 amp.

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: MINES Ex. INC Line: 3 Sp/ 5½ Int.Cal Date:

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
Rec.	1000 - 1250	→	→	→	1250	-1500	→	→		1-2		
Time	30	30	10	10	30	10	10	3		300		
DC-1	15.2 13.0	7.45 7.60	4.62 4.20	3.20 2.80	6.5 6.7	4.48 4.38	2.85 2.72	1.90 2.21		99 99		
DC-2	15.5 12.8	7.45 7.60	4.64 4.18	3.20 2.80	6.4 6.9	4.60 4.26	2.80 2.77	1.86 2.24		99 99		
Σ	28.2 28.3	15.05 15.05	/		13.2 13.3	8.86 8.86	5.57 5.57	4.1 4.10		198		
DC-3	15.6 12.6	7.40 7.65	4.64 4.18	3.20 2.80	6.2 7.1	4.66 4.20	2.78 2.80	1.84 2.26				
Dc-4	15.8 12.5	7.40 7.65			6.0 7.3	4.80 4.06	2.74 2.83	1.84 2.27				
Σ	28.2 28.3	15.05			13.3 13.3	8.86 8.86	5.58 5.57	4.10 4.11				
DC-AV	28.25	15.05	8.82	6.0	13.275	8.86	5.5725	4.105		198		
AC-1	14.15	7.50	4.41	2.99	6.55	4.44	2.78	2.05		99		
AC-2	14.15	7.50	4.41	2.99	6.55	4.44	2.78	2.05		99		
Σ	28.30	15.0	8.82	5.98	13.10	8.88	5.56	4.10		198		
S. P.	-6.8				+16.1							
AC-N	.52											
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX. INC Line: 3 Sp1 5½ Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-250	250-500 →		500-750 →			750-1000 →					
Time	300	100	30	100	30	30	100	30	30	10		
DC-1	64.0 64.5	49.7 49.9	20.40 19.85	55.9 55.9	19.3 19.1	10.3 9.9	47.6 49.4	17.0 17.0	7.6 8.6	5.26 4.84		
DC-2	64.0 64.5	49.7 49.9	20.40 19.85	55.9 55.9	19.4 19.0	10.3 9.9	47.6 49.4	17.1 16.9	7.6 8.6	5.34 4.76		
Σ										10.1 0 10.1 0		
DC-3	64.0 64.5	49.7 49.9	20.40 19.85	55.9 55.9	19.4 19.0	10.3 9.9	47.6 49.4	17.1 16.9	7.6 8.6	5.40 4.70		
Dc-4										5.46 4.64		
Σ										10.1 10.1		
DC-AV	128.5	99.6	40.25	111.8	38.4	20.2	97.0	34.0	16.2	10.10		
AC-1	64.0	49.7	20.1	55.7	19.2	10.05	48.0	17.0	8.10	5.06		
AC-2	64.0	49.7	20.1	55.7	19.2	10.05	48.10	17.0	8.10	5.06		
Σ	128	99.4	40.2	111.4	38.4	20.1	96.2	34	16.2	10.12		
S. P.	-3.4	-2.4		+4.2		-0.6						
AC-N	.02	.02		.03		.02						
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX. INC Line: 3 Sp 1 N½ Int.Cal _____ Date: _____

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal.		
Rec.	1000 –	1250	→	→	1250 –	1500	→	→		4-5		
Time	100	30	30	10	30	10	10	10		300		
DC-1	22.0 23.2	9.55 11.6	6.5 6.5	3.68 3.48	8.90 8.60	4.98 5.21	3.52 3.62	2.26 1.80		99 99		
DC-2	21.8 23.4	9.50 11.65	6.5 6.5	3.74 3.46	8.90 8.60	4.88 5.30	3.46 3.68	2.26 1.80		99 99		
Σ												
DC-3	21.8 23.4	9.50 11.65	6.5 6.5	3.76 3.44	8.90 8.60	4.79 5.39	3.42 3.72	2.30 1.78				
Dc-4				3.78 3.42		4.72 5.46	3.40 3.74	2.30 1.78				
Σ												
DC-AV	45.2	21.15	13.0	7.19	17.5	10.18	7.14	4.07		198		
AC-1	22.3	10.55	6.45	3.58	8.70	5.05	3.55	2.02		99		
AC-2	23.3	10.55	6.45	3.58	8.70	5.05	3.55	2.02		99		
Σ	44.6	21.10	12.90	7.16	17.40	10.10	7.10	4.04		198		
S. P.	+2.6				-3.7							
AC-N	.02				.03							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex. INC Line: 3 Sp1 N½ Int.Cal _____ Date: 1-20-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-250	250-500	0 →	500-750	→	→	750-1000	→	→	→		
Time	100	300	30	300	100	30	300	100	30	10		
DC-1	50.8 49.9	66.0 66.0	20.4 20.0	65. 67.	23.8 26.2	10.5 10.2	67.5 68.5	22.4 23.9	13.1 11.9	6.20 6.02		
DC-2	50.8 49.9	66.0 66.0	20.4 20.0	65 67	23.8 26.2	10.5 10.2	67.0 69.0	22.4 23.9	13.1 11.9	6.20 6.02		
Σ												
DC-3	50.8 49.9	66.0 66.0	20.4 20.0	65 67	23.8 26.2	10.5 10.2	67.0 69.0	22.4 23.9	13.1 11.9	6.20 6.02		
Dc-4												
Σ												
DC-AV	100.7	132	40.4	132	50.0	20.7	136.0	46.3	25.0	12.22		
AC-1	50.1	65.5	20.1	65.5	24.8	10.3	67.0	23.0	12.4	6.08		
AC-2	50.1	65.5	20.1	65.5	24.8	10.3	67.0	23.0	12.4	6.08		
Σ	100.2	131.0	40.2	131 0	49.6	20.6	134	46	24.8	12.16		
S. P.	+4.0	-4.5		-0.3			-7.4					
AC-N	.03	.03		.05			.02					
Pot.Res.												

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page _____

Project Mines Ex Inc Line 1 250' N20W ½ Field date 17 Jan 67 Data page _____ Comp. date 17 Jan 67 Comp by TWL

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-250NW	250-500NW	→	500-750NW	→	→	750-1000NW	→	→	→	1000-1250'	→
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	2	←	←	←	←	←	←	←	←	←	←	→
(E) Vdc (avg)	762	669	197.5	1034	257	99	760	296	102.8	47.9	211.5	119.2
(F) DCcal	.1518	←	←	←	←	←	←	←	←	←	←	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρ dc=ExFxGx10^3/D	148	130	153	201	200	192	147	230	199	186	164	231
(I) Vac Σ	738	656	192	1008	248	95.8	750	289	100	46.6	208	116.4
(J) AC noise x 2	←	←	←	←	←	←	←	←	←	←	←	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	←	←	←	←	←	←	←	←	←	←	←	→
(L) AC-DC cal.	.995	←	←	←	←	←	←	←	←	←	←	→
(M) ρ dc/ρac=ExL/K	1029	1012	1022	1021	1031	1028	1008	1019	1022	1022	1011	1020
(N) PFE=(M-1)(10^2)	2.9	1.2	2.2	2.1	3.1	2.8	0.8	1.9	2.2	2.2	1.1	2.0
(O) MCF=(M-1)(10^5)/H	20	9	14	10	16	15	5	8	11	12	7	9

Project _____ Line _____ Field date _____ Data page _____ Comp. date _____ Comp by _____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2			cal			
(B) Receive	→	→	1250-1500NW	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→			1			
(E) Vdc (avg)	48.6	25.175	95.6	67.8	30.55	17.5			193			
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	189	171	186	254	204	190						
(I) Vac Σ	47.6	24.90	93.2	64.2	29.9	17.2			192			
(J) AC noise x 2	←	←	←	←	←	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	←	←	←	←	←	→						
(L) AC-DC cal.	→	→	→	→	→	→						
(M) ρdc/ρac =ExL/K	1016	1006	1021	1032	1017	1012						
(N) PFE=(M-1)(10^2)	1.6	0.6	2.1	3.2	1.7	1.2						
(O) MCF=(M-1)(10^5)/H	8	4	11	21	8	6						

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 1 (250') 5200E Field date 17 Jun 67 Data page_____ Comp. date 17 Jun 67 Comp by JWL

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	0-250	250-500	→	500-750			750-1000			→	1000-1250	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	2	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	677	788	197	595	324	107.4	361	135	95.6	36.6	61.6	38.1
(F) DCcal	505	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρdc=ExFxGx10^3/D	128.2	149.2	149.1	112.9	245.8	203.8	68.4	104.3	181.1	127.2	46.7	72.1
(I) Vac Σ	670	766	193	590	317	106	353	132	93	36	60.2	37.8
(J) AC noise x 2	→	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	1.009	→	→	→	→	→	→	→	→	→	→	→
(M) ρdc/ρac=ExL/K	1020	1038	1030	1018	1030	1023	1031	1030	1048	1026	1032	1026
(N) PFE=(M-1)(10^2)	2.0	3.8	3.0	1.8	3.0	2.3	3.1	3.0	4.8	2.6	3.2	2.6
(O) MCF=(M-1)(10^5)/H	16	25	16	16	12	11	41	29	27	20	62	36

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		Cal				
(B) Receive	→	→	1250-1500	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→						
(E) Vdc (avg)	31.6	13.5	22.09	15.65	13.95	6.61		198				
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρdc=ExFxGx10^3/D	119.8	89.6	41.8	59.4	92	70.1						
(I) Vac Σ	31	13.2	21.9	15.4	13.7	6.52		200				
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	→	→	→	→	→	→		1.009				
(M) ρdc/ρac =ExL/K	1028	1031	1018	1019	1026	1020						
(N) PFE=(M-1)(10^2)	2.8	3.1	1.8	1.9	2.6	2.0						
(O) MCF=(M-1)(10^5)/H	23	34	43	32	28	48						

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex. Inc, Line: 1 Sp1 N20°W 1/2 (250) Int.Cal _____ Date: 17 Jan 67

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		4-5		
Time	300	100	100	30	100	100	30	30		300		
DC-1	105.0 106.5	58.0 61.2	22.5 26.1	13.0 12.2	47.6 48.0	33.7 34.1	14.9 15.65	8.2 9.3		96.5 96.5		
DC-2	105.0 106.5	58.0 61.2	22.5 26.1	13.0 12.1	47.6 48.0	33.7 34.1	14.85 15.7	8.2 9.3		96.5 96.5		
Σ							30.85 30.55			193.0		
DC-3	105.0 106.5	58.0 61.2	22.5 26.1	13.1 12.1	47.6 48.0	33.7 34.1	14.85 15.7	8.2 9.3				
Dc-4				13.1 12.1			14.75 15.8					
Σ												
DC-AV	211.5	119.2	48.6	25.175	95.6	67.8	30.55	17.5				
AC-1	104.0	58.2	23.8	12.45	46.6	32.6	14.95	8.60		96.0		
AC-2	104.0	58.2	23.8	12.45	46.6	32.6	14.95	8.60		96.0		
Σ	208	116.4	47.6	24.90	93.2	65.2	29.90	17.20				
S. P.	-7.8				-7.5							
AC-N	.03				.04							

INDUCED POLARIZATION - RECEIVER NOTES

PAGE

Project: Mines Ex. Inc. Line: 1 Sp 1 N20W 1/2 (250) Int.Cal Date: 1-17-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-250	250-500 →		500-750 →			750-1000 →					
Time	1000	1000	300	1000	300	100	1000	300	100	100		
DC-1	382 380	335 334	97.5 100.0	517 517	127.0 130.0	49.2 49.8	380 380	148 148	52.0 50.8	23.6 24.3		
DC-2	382 380	335 334	97.5 100.0	517 517	127.0 130.0	49.2 49.8	380 380	148 148	52.0 50.8	23.6 24.3		
Σ												
DC-3	382 380	335 334	97.5 100.0	517 517	127.0 130.0	49.0 50.0	380 380	148 148	52.0 50.8	23.6 24.3		
Dc-4						49.0 50.0						
Σ												
DC-AV	762	669	197.5	1034	257.0	99	760	296	102.8	47.9		
AC-1	369	328	96.0	504	124.0	47.9	375	144.5	50.0	23.3		
AC-2	369	328	96.0	504	124.0	47.9	375	144.5	50.0	23.3		
Σ	738	656	192.0	1008	248.0	95.8	750	289.0	100	46.6		
S. P.	-5.8	-11.7		-14.7			+1.1					
AC-N	.03	.03		.02			.03					

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex. Inc. Line: 1 Sp 520E (250) Int.Cal _____ Date: 17 Jan 67

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-250	250-500 →		500-750 →			750-1000 →					
Time	1000	1000	300	1000	300	100	300	300	100	30		
DC-1	338 339	395 393	98 99	299 296	165 159	54.0 53.4	180 181	67 68	47.7 47.9	18.1 18.5		
DC-2	338 339	395 393	98 99	299 296	165 159	54.0 53.4	180 181	67 68	47.7 47.9	18.1 18.5		
Σ	677											
DC-3	338 339	395 393	98 99	299 296	165 159	54.0 53.4	180 181	67 68	47.7 47.9	18.1 18.5		
Dc-4												
Σ												
DC-AV	677	788	197	595	324	107.4	361	135	95.6	36.6		
AC-1	335	383	96.5	290	158.5	53.0	176.5	66.0	46.5	18.0		
AC-2	335	383	96.5	290	158.5	53.0	176.5	66.0	46.5	18.0		
Σ	670	766	193.0	590	317.0	106.0	353.0	132	930	36		
S. P.	+3.1	-8.2		+1.1			-3.3					
AC-N	.04	.02		.02			.04					
Pot. Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex, INC. Line: 1 Sp 1 S 20° E (250) Int.Cal _____ Date: 12 Jul 67

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		1-2		
Time	100	30	30	30	30	30	30	10		300		
DC-1	30.6 28.2 30.8 33.4	19.0 19.1	15.1 16.5	6.9 6.6	12.35 12.6 9.60 9.5	7.75 7.90	6.80 7.15	3.38 3.24		99 99		
DC-2	30.1 28.0 31.6 33.8	19.2 18.9	15.0 16.6	6.9 6.6	12.6 12.7 9.45 9.45	7.70 7.95	6.70 7.20	3.38 3.24		99 99		
Σ	61.4 61.6 61.7 61.8	38.1 38.1	31.6 31.6		22.05 22.1 22.05 22.1	15.65 65	13.95 13.90	6.62 6.62				
DC-3	29.5 27.6 32.3 34.0	19.4 18.7	14.9 16.7	6.9 6.6	12.1 12.2 9.95 9.95	7.70 7.95	6.70 7.25	3.40 3.20				
Dc-4	28.6 27.4 32.6 34.2	19.5 18.6	14.7 16.9		12.45 12.3 9.45 9.9	7.70 7.95	6.60 7.40	3.40 3.20				
Σ	61.8 61.6 61.3 61.6	38.1	31.6		22.05 22.1 22.45 22.0		13.95 13.0	6.60 6.60				
DC-AV	61.6	38.1	31.6	13.5	22.09	15.65	13.95	6.61		198		
AC-1	30.1	18.9	15.5	6.60	10.95	7.70	6.85	3.26		100		
AC-2	30.1	18.9	15.5	6.60	10.95	7.70	6.85	3.26		100		
Σ	60.2	37.8	31	13.2	21.90	15.40	13.70	6.52		200		
S. P.	-24.0			-23.5								
AC-N	.05			.02								
Pot.Res.												

250' SP.

INDUCED POLARIZATION SENDER NOTES

project: Mines X Inc. Line: 1 5 1/2 Date: 1-17-66.

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1/2		
Receive												
Time												
Range	90V											
Current	2	2	2	2	2	2	2	2	2	2	Cut	
Send	4/3	3/4	2/3	1/2	4/3	3/4	2/3	1/2			4/5	
Receive												
Time												
Range											60V	
Current	2	2	2	2	2	2	2	2			1	

INDUCED POLARIZATION SENDER NOTES

project: Minex X Inc Line: 1 N/E Date: 1-17-66

Send	4/5	3/4	4/5	2/3	3/4	4/5	1/2	2/3	3/4	4/5		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5			Cal 1-2	
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2			1	

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project MINES EX. INC Line 2 S 1/2 Field date 1-18-67 Data page_____ Comp. date_____. Comp by I.P.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive	0-250	250-500	→	500-750	→	→	750-1000	→	→	→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	2	→	→	→	→	→	→	→	→	→		
(E) Vdc (avg)	1048	1160	336	1550	478	189	1020	353	130	57.2		
(F) DCcal	.498											
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15		
(H) ρdc=ExFxGx10^3/D	195	216	251	289	357	352	191	264	242	214		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	1028	1132	328	1500	460	182	988	342	126	55.6		
(L) AC-DC cal.	1.000											
(M) ρdc/ρac=ExL/K	1.020	1.023	1.023	1.032	1.038	1.039	1.032	1.038	1.031	1.029		
(N) PFE=(M-1)(10^2)	2.0	2.3	2.3	3.2	3.8	3.9	3.2	3.8	3.1	2.9		
(O) MCF=(M-1)(10^5)/H	10	11	9	11	11	11	17	14	13	14		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
(B) Receive	1000-1250	→	→	→	1250-1500	→	→	→		1-2		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	2	→	→	→	→	→	→	→		2		
(E) Vdc (avg)	206	119.7	55.6	29.2	131.0	98.0	50.8	29.3		402		
(F) DCcal												
(G) Kn x 10^{-3}	3	7.5	15	26.25	7.5	15	26.25	42				
(H) ρ dc=ExFxGx10^3/D	154	223	206	191	244	366	331	307				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	198	115.6	53.6	28.4	127	93.0	49.4	28.7		402		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.041	1.035	1.037	1.028	1.032	1.054	1.029	1.021				
(N) PFE=(M-1)(10^2)	4.1	3.5	3.7	2.8	3.2	5.4	2.9	2.1				
(O) MCF=(M-1)(10^5)/H	27	16	18	15	13	15	9	7				

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project MINES EX. INC. Line 2 N 1/2 Field date 1-18-67 Data page_____ Comp. date_____. Comp by R.P.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	0-250	250-500	→	500-750	→	→	750-1000	→	→	→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	2	→	→	→	→	→	→	→	→	→		
(E) Vdc (avg)	1178	1012	333	670	340	142.5	481	217	144	70.1		
(F) DCcal	.496											
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15		
(H) ρ dc=ExFxGx10^3/D	219	188	248	124	252	265	90	161	268	261		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	1148	994	324	652	332	138.0	470	210	138.0	67.4		
(L) AC-DC cal.	1.000											
(M) ρ dc/ρac=ExL/K	1.025	1.019	1.027	1.026	1.045	1.032	1.023	1.032	1.043	1.041		
(N) PFE=(M-1)(10^2)	2.5	1.9	2.7	2.6	4.5	3.2	2.3	3.2	4.3	4.1		
(O) MCF=(M-1)(10^5)/H	11	10	11	21	18	12	25	20	16	16		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal.		
(B) Receive	1000-1250	→	→	→	1250-1500	→	→	→		4-5		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	2	→	→	→	→	→	→	→		2		
(E) Vdc (avg)	159.5	93.6	68.8	35.4	52.2	36.1	30.1	15.8		403		
(F) DCcal												
(G) Kn x 10^{-3}	3	7.5	15	26.25	7.5	15.0	26.25	42.0				
(H) ρ dc=ExFxGx10^3/D	119	174	256	230	97	134	218	165				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	155.0	90.4	66.8	34.2	49.4	34.2	28.5	15.0		403		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.029	1.036	1.030	1.034	1.056	1.055	1.056	1.052				
(N) PFE=(M-1)(10^2)	2.9	3.6	3.0	3.4	5.6	5.5	5.6	5.2				
(O) MCF=(M-1)(10^5)/H	24	21	12	15	58	41	26	31				

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex. Inc. Line: 2 S 1/2 (250') Int.Cal _____ Date: _____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		Cal.		
Rec.	1000-1250 →			→	1250-1500 →			→		1-2		
Time	300	100	100	30	300	100	100	30		300		
DC-1	103 103	59.5 60.2	28.2 27.4	15.1 14.1	65.0 66.0	48.0 50.0	26.8 24.0	15.0 14.3		201 201		
DC-2	103 103	59.5 60.2	28.2 27.4	15.1 14.1	65.0 66.0	48.0 50.0	26.8 24.0	15.0 14.3		201 201		
Σ												
DC-3	103 103	59.5 60.2	28.2 27.4	15.1 14.1	65.0 66.0	48.0 50.0	26.8 24.0	15.0 14.3				
Dc-4												
Σ			55.6	29.2	131.0	98.0	50.8	29.3		402		
DC-AV	206	119.7										
AC-1	99.0	57.8	26.8	14.2	63.5	46.5	24.7	14.35		201		
AC-2	99.0	57.8	26.8	14.2	63.5	46.5	24.7	14.35		201		
Σ	198.0	115.6	53.6	28.4	127.0	93.0	49.4	28.7		402		
S. P.	-2.1				-0.9							
AC-N	.02				.02							

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex INC. Line: 2 S 1/2 (250') Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-250	250-500 →		500-750 →			750-1000 →					
Time	1000	1000	300	1000	1000	300	1000	300	300	100		
DC-1	524 524	581 579	167 169	775 775	240 238	94 95	510 510	177 176	66.0 64.0	28.4 28.8		
DC-2	524 524	581 579	167 169	775 775	240 238	94 95	510 510	177 176	66.0 64.0	28.4 28.8		
Σ												
DC-3	524 524	581 579	167 169	775 775	240 238	94 95	510 510	177 176	66.0 64.0	28.4 28.8		
Dc-4												
Σ												
DC AV	1048	1160	336	1550	478	189	1020	353	130.0	57.2		
AC-1	514	566	164	750	230	91.0	494	171	63.0	27.8		
AC-2	514	566	164	750	230	91.0	494	171	63.0	27.8		
Σ	1028	1132	328	1500	460	182.0	988	342	126	55.6		
S. P.	+12.9	+10.6		-2.3			-7.1					
AC-N	.02	.03		.02			.02					

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: Mines Ex. Inc. Line: 2 N½ (250') Int.Cal _____ Date: _____

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		Cal.		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		4-5		
Time	300	100	100	30	100	30	30	30		300		
DC-1	78.5 81.0	45.9 47.7	36.0 32.8	18.3 17.1	26.0 26.2	18.6 17.5	14.1 16.0	8.3 7.5		201.5 201.5		
DC-2	78.5 81.0	45.9 47.7	36.0 32.8	18.3 17.1	26.0 26.2	18.6 17.5	14.1 16.0	8.4 7.4		201.5 201.5		
Σ												
DC-3	78.5 81.0	45.9 47.7	36.0 32.8	18.3 17.1	26.0 26.2	18.6 17.5	14.1 16.0	8.4 7.4				
Dc-4												
Σ	159.5	93.6	68.8	35.4	52.2	36.1	30.1	15.8				
DC-AV										403		
AC-1	77.5	45.2	33.4	17.1	24.7	17.1	14.25	7.50		201.5		
AC-2	77.5	45.2	33.4	17.1	24.7	17.1	14.25	7.50		201.5		
Σ	155.0	90.4	66.8	34.2	49.4	34.2	28.5	15.0		403		
S. P.	-2.3				-1.9							
AC-N	.02				.02							

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Mines Ex. Inc. Line: 2 N 1/2 (250') Int.Cal Date:

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-250	250-500 →		500-750 →		→	750-1000 →			→		
Time	1000	1000	300	1000	300	300	1000	300	300	100		
DC-1	588 590	506 506	165 168	336 334	168 172	74.5 68.0	241 240	110 107	74.0 70.0	34.2 35.9		
DC-2	588 590	506 506	165 168	336 334	168 172	74.5 68.0	241 240	110 107	74.0 70.0	34.2 35.9		
Σ												
DC-3	588 590	506 506	165 168	336 334	168 172	74.5 68.0	241 240	110 107	74.0 70.0	34.2 35.9		
Dc-4												
Σ	1178	1012	333	670	340	142.5	481	217	144	70.1		
DC-AV												
AC-1	574	497	162	326	166	69.0	235	105	69.0	33.7		
AC-2	574	497	162	326	166	69.0	235	105	69.0	33.7		
Σ	1148	994	324	652	332	138.0	470	210	138.0	67.4		
S. P.	+3.7	-12.7		-25.7			+10.5					
AC-N	.01	.02		.02			.02					

INDUCED POLARIZATION SENDER NOTES

project: Mines X inc Line: 2 S 1/2 Date: 1-18-67

Send	4/5	3/4	4/5	2/3	3/4	4/5	1/2	2/3	3/4	4/5		
Receive	9	→	→	→	→	→	→	→	→	→		
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5			col 1-2	
Receive	→	→	→	→	→	→	→	→				
Time												
Range												
Current	2	2	2	2	2	2	2	2			2	

250' SPI

INDUCED POLARIZATION / SENDER NOTES

project: Mines X Inc Line: 2 N 3 Date: 1-18-87

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1-2		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		
Send	4/5	3/4	2-3	1-2	4 5	3/4	2-3	1-2		4.5		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 6 Spl 3½ Field date 18 Jan Data page_____ Comp. date 18 Jan . Comp by_____

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive 250-500S →	500-750S →		750-1000S →			1000 - 1250S →				1250 -	1500S-	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	2											
(E) Vdc (avg) (1)	448	389	92.9	355	106.9	40.6	239	80	44.6	24.95	89	39.95
(F) DCcal	.490											→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρ dc=ExFxGx10^3/D	82.4	72	68	65	74	75	44	59	82	92	65	64
(I) Vac Σ (2)	440	378	90.6	343	101.2	39.8	232	78.8	43.6	24.4	87.6	39.3
(J) AC noise x 2												→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												→
(L) AC-DC cal.	.990											→
(M) ρ dc/ρac=ExL/K Ans	1008	10.19	1.015	1.026	1.043	1019	1.019	1.006	1.013	1.012	1.006	1.007
(N) PFE=(M-1)(10^2)	0.8	1.9	1.5	2.6	4.3	1.9	1.9	0.6	1.3	1.2	0.6	0.7
(O) MCF=(M-1)(10^5)/H	10.	26	22	40	58	25	43	10	16	13	9	11

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		Cal				
(B) Receive	→	→	1500-	1750S	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→						
(E) Vdc (avg)	27.05	16.1	33.05	16.85	13.75	9.55		404				
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	100	104	61	62	89	98						
(I) Vac Σ	26.70	15.90	32.4	16.7	13.6	9.34		400				
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	→	→	→	→	→	→						
(M) ρdc/ρac =ExL/K	1.003	1.003	1.010	1.000	1.001	1013						
(N) PFE=(M-1)(10^2)	0.3	0.3	1.0	0.0	0.1	1.3						
(O) MCF=(M-1)(10^5)/H	3	3	2	0	1	13						

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex, Inc. Line 6 Sp1 N½ Field date 1-18-67 Data page_____ Comp. date 1/18/67 . Comp by R.P.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	250S-0	0-250N →		250-500N	→		500-750N			→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	2	→								→		
(E) Vdc (avg)	389	441	88	536	108.3	37.6	460	163	46.8	21.0		
(F) DCcal	.498											
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15.0		
(H) ρdc=ExFxGx10^3/D	73	83	66	100	81	70	86	122	88	79		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	378	433	86.4	524	107.4	37.2	450	159	46.4	20.8		
(L) AC-DC cal.	.993											
(M) ρ dc/ρac=ExL/K	1.022	1.012	1.011	1.017	1.002	1.003	1.016	1.017	1.006	1.003		
(N) PFE=(M-1)(10^2)	2.2	1.2	1.1	1.7	0.2	0.3	1.6	1.7	0.6	0.3		
(O) MCF=(M-1)(10^5)/H	30	14	17	17	2	4	19	14	7	4		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal		
(B) Receive	750-1000			→	1000-1250N			→		4-5		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	2	→						→		2		
(E) Vdc (avg)	124	60.1	21.1	11.02	52.3	31.5	12.5	7.04		402		
(F) DCcal												
(G) Kn x 10^{-3}	3	7.5	15.0	26.25	7.5	15.0	26.25	42.0				
(H) ρ dc=ExFxGx10^3/D	93	112	79	72	98	118	82	74				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	122	59.4	20.9	10.88	51.8	31.1	12.44	7.00		399		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.009	1.006	1.003	1.008	1.003	1.006	1.002	.999				
(N) PFE=(M-1)(10^2)	0.9	0.6	0.3	0.8	0.3	0.6	0.2	-0.1				
(O) MCF=(M-1)(10^5)/H	10	5	4	11	3	5	2	-2				

INDUCED POLARIZATION - RECEIVER NOTES PAGE_____

Project: MINES EX. INC Line: 6 Sp 1 5½ Int.Cal_____ Date:_____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		1-2		
Time	100	30	30	30	30	30	30	10		300		
DC-1	44.8 44.2	19.50 20.45	12.90 14.15	8.40 7.70	16.95 16.10	8.60 8.25	7.05 6.70	4.57 4.98		202 202		
DC-2	44.8 44.2	19.50 20.45	12.90 14.15	8.40 7.70	16.95 16.10	8.60 8.25	7.05 6.70	4.57 4.98		202 202		
Σ	89 89	39.95 39.95										
DC-3	44.8 44.2	19.50 20.45	12.90 14.15	8.40 7.70	16.95 16.10	8.60 8.25	7.05 6.70	4.57 4.98				
Dc-4		95										
Σ												
DC-AV	89	39.95	27.05	16.1	33.05	16.85	13.75	9.55				
AC-1	43.8	19.65	13.35	7.95	16.2	8.35	6.80	4.67		200		
AC-2	43.8	19.65	13.35	7.95	16.2	8.35	6.80	4.67		200		
Σ	87.6	39.30	26.70	15.90	32.4	16.70	13.60	9.34				
S. P.	-3.3				+12.3							
AC-N	.02				.03							

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: MINE EX. INC Line: 6 Sp1 S1/2 Int.Cal Date:

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-250	250-500 →		500-750 →			750-1000 →					
Time	1000	300	100	300	100	100	300	100	100	30		
DC-1	224 224	195 194	47.5 45.4	179 176	53.8 50.1	20.2 20.4	120 119	41.4 38.6	23.6 21.0	12.90 12.05		
DC-2	224 224	195 194	47.5 45.4	179 176	53.8 53.1	20.2 20.4	120 119	41.4 38.6	23.6 21.0	12.90 12.05		
Σ												
DC-3	224 224	195 194	47.5 45.4	179 176	53.8 53.1	20.2 20.4	120 119	41.4 38.6	23.6 21.0	12.90 12.05		
Dc-4												
Σ		389										
DC-AV	448	389	92.9	355	106.9	40.6	239	80.0	44.6	24.95		
AC-1	220	189	45.3	171.5	50.6	19.9	116	39.4	21.8	12.2		
AC-2	220	189	45.3	171.5	50.6	19.9	116	39.4	21.8	12.2		
Σ	440	378	90.6	343.0	101.2	39.8	232	78.8	43.6	24.4		
S. P.	-.03	-1.0		-2.1			-8.9					
AC-N	.02	.03		.04			.03					

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: MINES EX. INC Line: 6 Sol N½ Int.Cal Date:

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		col.		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		4-5		
Time	100	100	30	10	100	30	10	10		300		
DC-1	61.8 62.2	29.9 30.2	10.7 10.4	5.62 5.40	25.8 26.5	15.5 16.0	6.32 6.18	3.59 3.45		201 201		
DC-2	61.8 62.2	29.9 30.2	10.7 10.4	5.62 5.40	25.8 26.5	15.5 16.0	6.38 6.12	3.61 3.43		201 201		
Σ							1250 0	70.4				
DC-3	61.8 62.2	29.9 30.2	10.7 10.4	5.62 5.40	25.8 26.5	15.5 16.0	6.42 6.08	3.64 3.40				
Dc-4							6.46 6.04	3.65 3.39				
Σ												
DC-AV	124.0	60.1	21.1	11.02	52.3	31.5	12.5	7.04		402		
AC-1	61.0	29.7	10.45	5.44	25.9	15.55	6.22	3.50		199.5		
AC-2	61.0	29.7	10.45	5.44	25.9	15.55	6.22	3.50		199.5		
Σ	122	59.4	20.90	10.88	51.8	31.1	12.44	7.0		399.0		
S. P.	-2.2											
AC-N	.03				.02							

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: MINES Ex, INC. Line: 6 Sp1 N½ Int.Cal _____ Date: _____

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-250	250-500	→	500-750		→	750-1000	→	→	→		
Time	300	300	100	1000	100	30	1000	300	100	30		
DC-1	194 195	220 221	43.4 44.6	268 268	52.8 55.5	19.0 18.6	228 232	83 80	25.8 21.0	10.95 10.05		
DC-2	194 195	220 221	43.4 44.6	268 268	52.8 55.5	19.0 18.6	228 232	83 80	25.8 21.0	11.00 10.00		
Σ												
DC-3	194 195	220 221	43.4 44.6	268 268	52.8 55.5	19.0 18.6	228 232	83 80	25.8 21.0	11.00 10.00		
Dc-4												
Σ												
DC-AV	389	441	88	536	108.3	37.6	460	163	46.8	21.0		
AC-1	189	216.5	43.2	262	53.7	18.6	225	79.5	23.2	10.4		
AC-2	189	216.5	43.2	262	53.7	18.6	225	79.5	23.2	10.4		
Σ	378	433.0	86.4	524	107.4	37.2	450	159	46.4	20.8		
S. P.	-3.7	-8.7		-2.7			-4.1					
AC-N	.04	.02		.02			.02					

INDUCED POLARIZATION SENDER NOTES

project: _____ Line: 6 - N½ Date: _____

Send	1/2	2/3	1/2	3/4	2/3	1/2	4/5	3/4	2/3	1-2		
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2		
Send	4/5	3/4	2/3	1/2	4/5	3/4	2/3	1/2			all 4/5	
Receive												
Time												
Range												
Current	2	2	2	2	2	2	2	2			2	

2:50 pm

SPREAD 250'

INDUCED POLARIZATION SENDER NOTES

project: Mines EXP Line: 6 5 ½ Date: 1 18 67

Send	4-5	3 4	4 5	2 3	3 4	4 5	1 2	2 3	3 4	4 5				
Receive		→		→	→		→	→						
Time														
Range														
Current	2	2	2	2	2	2	2	2	2	2				
Send	1-2	2 3	3 4	4 5	1 2	2 3	3 4	4 5		1-2 CAL				
Receive		→	→	→		→	→	→						
Time														
Range														
Current	2	2	2	2	2	2	2	2		2				

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 6 S½ Sp2 Field date 19 Jun 67 Data page_____ Comp. date 20 Jun 67. Comp by J. W.L.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	1250-1500N	1000-	1250 →	750-	1000 →		500 - 750N			→	250-500	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1	2	1	1	1	1	1	1	1	1	1	1
(E) Vdc (avg)	470	614	92.4	314.5	92.2	38.95	260	102.2	43	22.3	64.3	35.55
(F) DCcal	.5											→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρdc=ExFxGx10^3/D	176	115	139	118	138	146	98	153	161	167	96	133
(I) Vac Σ	454	604	91.6	311.0	91.6	38.70	257	111	43.2	22.1	64.2	35.6
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1											
(M) ρ dc/ρac=ExL/K	1037	1018	1008	1011	1008	1007	1011	1011	.995	1008	1001	.994
(N) PFE=(M-1)(10^2)	3.7	1.8	0.8	1.1	0.8	0.7	1.1	1.1	-0.5	0.8	0.1	-0.6
(O) MCF=(M-1)(10^5)/H	21	15	6	10	6	5	4	7	-3	5	1	-2

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5			Ca Q			
(B) Receive	→	→	0-250	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	1	1	1	1	1	1			1			
(E) Vdc (avg)	18.60	10.94	25.9	17.40	11.12	7.045						
(F) DCcal						→						
(G) Kn x 10^{-3}	1.5	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	139	144	92.1	131	146	148						
(I) Vac Σ	18.6	10.92	26	17.4	11	7.00						
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.000	1002	.996	1.000	1010	1.005						
(N) PFE=(M-1)(10^2)	0	0.2	-0.4	0	1.0	0.5						
(O) MCF=(M-1)(10^5)/H	0	1	-4	0	1	3						

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 6 N + Sp2 Field date 19 Jun 67 Data page_____ Comp. date 20 Jun 67 Comp by J.W.L

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	1500-1750	1750-2000N→		2000-2250N→			2250-2500→				2500-2750	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	2	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	598	944	182	1450	318	97.5	1240	280	99.7	39.5	33.9	117.0
(F) DCcal	.488	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρdc=ExFxGx10^3/D	109	172	122	268	214	178	226	188	182	133	228	214
(I) Vac Σ	590	926	180	143	312	96.4	121.6	276	98.8	39.2	333	115.6
(J) AC noise x 2	—	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	—	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	.9975	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1011	1017	1009	1007	1018	1008	1018	1011	1006	1004	1012	1010
(N) PFE=(M-1)(10^2)	1.1	1.7	0.9	0.7	1.8	0.8	1.8	1.1	0.6	0.4	1.2	1.0
(O) MCF=(M-1)(10^5)/H	10	10	8	3	8	4	8	6	3	3	5	5

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2						
(B) Receive	→	→	2750-3000	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	1	2	2						
(E) Vdc (avg)	50.2	22.9	90.3	19.00	19.	9.66			4.10			
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	169	146	165	142	121	99						
(I) Vac Σ	50.0	22.8	89	18.8	18.9	9.64			4.09			
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	→	→	→	→	→	→						
(M) ρdc/ρac =ExL/K	1001	1001	1011	1008	1002	1001						
(N) PFE=(M-1)(10^2)	0.1	0.1	1.1	0.8	0.2	0.1						
(O) MCF=(M-1)(10^5)/H	1	1	7	6	2	1						

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Mines Ex. Inc. Line: 6 Sp 2 N/2 Int.Cal Date: 1-19-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	1750-2000	2000-2250 →		2250-2500 →			2500-2750		→			
Time	1000	1000	300	1000	300	100	1000	300	100	30		
DC-1	299 299	472 472	91.0 91.0	725 725	159 159	49.0 48.5	620 620	139 141	51.5 48.2	19.65 19.85		
DC-2	299 299	472 472	91.0 91.0	725 725	159 159	49.0 48.5	620 620	139 141	51.5 48.2	19.65 19.85		
Σ												
DC-3	299 299	472 472	91.0 91.0	725 725	159 159	49.0 48.5	620 620	139 141	51.5 48.2	19.65 19.85		
Dc-4												
Σ												
DC-AV	598	944	182	1450	318	97.5	1240	280	99.7	39.50		
AC-1	295	463	90.0	714	156	48.2	608	138	49.4	19.6		
AC-2	295	463	90	714	156	48.2	608	138	49.4	19.6		
Σ	590	926	180.0	1438	312	96.4	1216	276	98.8	39.2		
S. P.	-11.2	-14.2		-8.9			-9.3					
AC-N	.03	.03		.04			.03					

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: MINES EX. INE Line: 6 Sp2 N½ Int.Cal Date:

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal		
Rec.	2750 –	3000	→	→	3000 –	3250	→	→		4-5		
Time	300	100	100	30	100	30	30	10		300		
DC-1	170 169	58.0 59.0	26.0 24.2	11.5 11.4	46.1 44.2	9.70 9.30	9.95 9.05	4.86 4.80		205 205		
DC-2	170. 169	58.0 59.0	26.0 24.2	11.5 11.4	46.1 44.2	9.70 9.30	9.95 9.05	4.86 4.80		205 205		
Σ												
DC-3	170 169	58.0 59.0	26.0 24.2	11.5 11.4	46.1 44.2	9.70 9.30	9.95 9.05	4.86 4.80				
Dc-4												
Σ							1900	9.66		410		
DC-AV	334	117.0	50.2	22.9	90.3	19.00	19.00	9.66		410		
AC-1	166.5	57.8	25.0	11.4	44.5	9.40	9.45	4.82		204.5		
AC-2	166.5	57.8	25.0	11.4	44.5	9.40	9.45	4.82		204.5		
Σ	333 0	115.6	50.0	22.8	89.0	18.80	18.90	9.64		409		
S. P.	-33.2				-2.5							
AC-N	.03				.03							

INDUCED POLARIZATION SP #2 SENDER NOTES

Project: Mines EX Line: 6 N to END N 1/2 Date: 1-19-67

Send	1/2	2/5	1/2	3/4	2/3	1/2	4/5	3/4	2/5	1/2		
Receive	~~1750~~ 5000	~~2000~~	~~2250~~	~~2250~~		~~2500~~	~~2500~~		2750			
Time												
Range												
Current	2	2	2	2	2	2	2	2	2	2	cal	
Send	4/5	3/4	2/3	1/2	4/5	3/4	2/5	1/2			4/5	
Receive												
Time												
Range												
Current	2	2	2	2	2	1	2	2			2	

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX. INC. Line: 6 Sp2 S1/2 Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	1500-1750	1250-1500 →		1000-1250 →		→	750-1000 →			→		
Time	1000	1000	100	300	100	30	300	100	100	30		
DC-1	235 235	309 305	44.2 48.2	157.5 157.0	46.6 45.6	19.50 19.45	130 130	50.4 51.8	22.5 20.5	11.0 11.3		
DC-2	235 235	309 305	44.2 48.2	157.5 157.0	46.6 45.6	19.50 19.45	130 130	50.4 51.8	22.5 20.5	11.0 11.3		
Σ												
DC-3	235 235	309 305	44.2 48.2	157.5 157.0	46.6 45.6	19.50 19.45	130 130	50.4 51.8	22.5 20.5	11.0 11.3		
Dc-4												
Σ												
DC-AV	470	614	92.4	314.5	92.2	38.95	260	102.2	43.	22.3		
AC-1	227	302	45.8	155.5	45.8	19.35	128.5	50.5	21.6	11.05		
AC-2	227	302	45.8	155.5	45.8	19.35	128.5	50.5	21.6	11.05		
Σ	454	604	91.6	311.0	91.6	38.70	257.0	101.0	43.2	22.10		
S. P.	-5.5	-16.8		-11.8			-12.5					
AC-N	.02	.03		.03			.03					

INDUCED POLARIZATION - RECEIVER NOTES 4 PAGE _____

Project: MINES EX, INC Line: 6 5½ Sp2 Int.Cal _____ Date: _____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal		
Rec.	500-750 →			→	250-500 →			→		1-2		
Time	100	30	30	10	30	30	10	10		300		
DC-1	32.0 32.3	18.05 17.50	9.60 9.00	5.50 5.44	13.9 12.0	8.90 8.50	5.50 5.62	3.28 3.78		100 100		
DC-2	32.0 32.3	18.05 17.50	9.60 9.00	5.50 5.44	13.9 12.0	8.90 8.50	5.50 5.62	3.26 3.78		100 100		
Σ								7.06 7.04		200		
DC-3	32.0 32.3	18.05 17.50	9.60 9.00	5.50 5.44	13.9 12.0	8.90 8.50	5.50 5.62	3.26 3.78				
Dc-4	64.3							3.26 3.78				
Σ								7.04 7.04				
DC-AV	64.3	35.55	18.60	10.94	25.9	17.40	11.12	7.045				
AC-1	32.1	17.8	9.30	5.46	13.0	8.70	5.50	3.50		100		
AC-2	32.1	17.8	9.30	5.46	13.0	8.70	5.50	3.50		100		
Σ	64.2	35.6	18.60	10.92	26.0	17.4	11	7.00		200		
S. P.	-11.3				+0.9							
AC-N	.03				.02							

INDUCED POLARIZATION SENDER NOTES

project: MINE EX Line: #6 S.#2 Date: 11/9/67

Send	4/5	3/4	4/5	2/3	3/4	4/5	1/2	2/3	3/4	4/5		
Receive	1750 1500	1500	1250	1250		1000	1000			750		
Time												
Range												
Current	1	2	1	1	1	1	1	1	1	1		
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5		Co 1-2		
Receive	750			500	500			250				
Time												
Range												
Current	1	1	1	1	1	1	1			1		

201
203
204

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 5 Sp 2 N½ Field date 20 Jun 67 Data page_____ Comp. date 20 Jun 67 Comp by JWL

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	1750-2000	2000-2250 →		2250-2500	→		2500-2750	→			2750-3000	→
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1.5	1	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg) ①	224	113.4	44.6	180	50.0	29.2	148	54.6	21.4	15.05	46	24
(F) DCcal	1.5	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρ dc=ExFxGx10^3/D	56	43	74	63	83	110	56	91	80	113	72	90
(I) Vac Σ ②	222	113.0	44.6	178	49.4	29.1	146	54.6	21.3	14.8	45.6	23.9
(J) AC noise x 2	→	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	1.0	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K Ans	1.010	1.005	1.000	1.011	1.011	1.002	1.013	1.000	1.005	1.018	1.008	1004
(N) PFE=(M-1)(10^2)	1.0	0.5	0	1.1	1.1	0.2	1.3	0	0.5	1.8	0.8	0.4
(O) MCF=(M-1)(10^5)/H	18	12	0	17	13	2	23	0	6	16	11	4

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2			Cal			
(B) Receive	→	→	3000-3250	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	8.95	→	→	→	→						
(E) Vdc (avg) ①	11.38	10.95	24.6	14.7	7.7	6.65			200			
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	85	144	92	110	100	140						
(I) Vac Σ ②	11.2	8.19	24.6	14.7	7.7	6.56			200			
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	1.0	→	→	→	→	→						
(M) ρdc/ρac =ExL/K Ans	1018	1.23? 1.005	1.000	1.000	1.000	1.012						
(N) PFE=(M-1)(10^2)	1.8	23.? 0.5	0	0	0	1.2						
(O) MCF=(M-1)(10^5)/H	21	? 3	0	0	0	9						

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 5 sp 2 Field date 20 Jan-67 Data page_____ Comp. date 20 Jan 67. Comp by T.W.L

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	1500-1750N	1250-1500→		1000-1250N		→	750-	1000N	→	→	500-750N	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg) ①	118.6	149	47.4	148	57.2	27.1	207	47.3	27.3	15.2	59.0	18.3
(F) DCcal	.5	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρ dc=ExFxGx10^3/D ⇒	44	56	79	55	95	102	78	79	102	114	98	69
(I) Vac Σ ②	118.4	148	47.2	147.2	56.4	26.96	203	47	27.2	15.1	58.8	18.2
(J) AC noise x 2	→	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	1.0	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K ANS	1.01	1.008	1.003	1.004	1.016	1.005	1.021	1.007	1.003	1.006	1.002	1.004
(N) PFE=(M-1)(10^2)	1.0	0.8	0.3	0.4	1.6	0.5	2.1	0.7	0.3	0.6	0.2	0.4
(O) MCF=(M-1)(10^5)/H	23	14	4	7	17	5	27	9	3	5	2	6

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		Cal				
(B) Receive	→	→	250-500N	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→						
(E) Vdc (avg) ①	12.5	7.7	24.85	9.82	7.4	4.94		200				
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	94	100	93	74	97	104						
(I) Vac Σ ②	12.48	7.64	24.7	9.68	7.3	4.86		200				
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	1.0	→	→	→	→	→						
(M) ρ dc/ρac =ExL/K ANS	1.001	1.009	1.015	1.014	1.013	1.017						
(N) PFE=(M-1)(10^2)	0.1	0.9	1.5	1.4	1.3	1.7						
(O) MCF=(M-1)(10^5)/H	1	9	16	19	13	18						

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: MINE EX. INE Line: 5 Sp2 N½ Int.Cal _____ Date: _____

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal		
Rec.	2750-3000	→	→	→	3000-3250N	→	→	→		4-5		
Time	100	30	10	10	30	30	10	10		300		
DC-1	23.0 23.0	12.05 11.95	5.58 5.80	5.30 ? 5.65	12.5 12.1	7.1 7.6	4.02 3.68	3.10 3.52		100 100		
DC-2	23.0 23.0	12.05 11.95	5.58 5.80	5.30 ? 5.65	12.5 12.1	7.1 7.6	4.04 3.66	3.12 3.54		100 100		
Σ								6.62 6.66				
DC-3	23.0 23.0	12.05 11.95	5.58 5.80	5.30 ? 5.65	12.5 12.1	7.1 7.6	4.06 3.64	3.10 3.54				
Dc-4								3.12 3.56				
Σ				8.95?				6.64 6.68				
DC-AV	46	24	11.38	10.95	24.6	14.7	7.70	6.65		200		
AC-1	22.8	11.95	5.60	4.45	12.3	7.35	3.85	3.28		100		
AC-2	22.8	11.95	5.60	4.45	12.3	7.35	3.85	3.28		100		
Σ	45.6	23.90	11.20	8.90	24.6	14.70	7.70	6.56		200		
S. P.	+0.5				+0.9							
AC-N	.04				.05							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: MINES EX INC Line: 5 SpZ N½ Int.Cal Date: 1-20-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	1750-2000N	2000-2250N		2250-2500	→		2500-2750			→		
Time	300	100	100	300	100	30	300	100	30	30		
DC-1	111	56.8	22.4	90.0	24.6	15.1	75.0	26.1	10.8	7.65		
	113	56.6	22.2	90.0	25.4	14.1	73.0	28.5	10.6	7.40		
DC-2	111	56.8	22.4	90.0	24.6	15.1	75.0	26.1	10.8	7.65		
	113	56.6	22.2	90.0	25.4	14.1	73.0	28.5	10.6	7.40		
Σ												
DC-3	111	56.8	22.4	90.0	24.6	15.1	75.0	26.1	10.8	7.65		
	113	56.6	22.2	90.0	25.4	14.1	73.0	28.5	10.6	7.40		
Dc-4												
Σ												
DC-AV	224	113.4	446	180	50.0	29.2	148.0	54.6	21.4	15.05		
AC-1	111	56.5	22.3	89.0	24.7	14.55	73.0	27.3	10.65	7.40		
AC-2	111	56.5	22.3	89.0	24.7	14.55	73.0	27.3	10.65	7.40		
Σ	222	113.0	44.6	178.0	49.4	29.10	146.0	54.6	21.30	14.8		
S. P.	-10.5	+5.2		-4.4			-2.6					
AC-N	.03	.04		.05			.05					
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: MINE Ex, Inc Line: 5 Sp 2 S1/2 Int.Cal _____ Date: 20 Jan

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal		
Rec.	500-750	→	→	→	250-500N	→	→	→		1-2		
Time	100	30	10	10	30	10	10	10		300		
DC-1	29.2 29.8	9.70 8.60	6.45 6.05	3.64 4.06	12.9 11.95	4.98 4.84	3.60 3.80	2.00 2.94		100 100		
DC-2	29.2 29.8	9.70 8.60	6.45 6.05	3.64 4.06	12.9 11.95	4.98 4.84	3.60 3.80	2.00 2.94		100 100		
Σ												
DC-3	29.2 29.8	9.70 8.60	6.45 6.05	3.64 4.06	12.9 11.95	4.98 4.84	3.60 3.80	2.00 2.94				
Dc-4												
Σ												
DC-AV	59.0	18.30	12.50	7.70	24.85	9.82	7.40	4.94		200		
AC-1	29.4	9.10	6.24	3.82	12.35	4.84	3.65	2.43		100		
AC-2	29.4	9.10	6.24	3.82	12.35	4.84	3.65	2.43		100		
Σ	58.8	18.2	12.48	7.64	24.70	9.68	7.30	4.86		200		
S. P.	+1.6				+2.7							
AC-N	.05				.05							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES Ex. INC Line: 5 Sp2 5½ Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec. 1500	-1750N	1250-	1500	1000-	1250	→	750-	1000		→		
Time	100	300	100	300	100	30	300	100	30	30		
DC-1	59.6 59.0	75 74	24.6 22.8	73.0 75.0	28.0 29.2	13.5 13.6	104 103	23.6 23.7	13.7 13.6	7.7 7.5		
DC-2	59.6 59.0	75 74	24.6 22.8	73.0 75.0	28.0 29.2	13.5 13.6	104 103	23.6 23.7	13.7 13.6	7.7 7.5		
Σ												
DC-3	59.6 59.0	75 74	24.6 22.8	730 75.0	28.0 29.2	13.5 13.6	104 103	23.6 23.7	13.7 13.6	7.7 7.5		
Dc-4												
Σ												
DC-AV	118,6	149	47.4	148	57.2	27.1	207	47.3	27.3	15.2		
AC-1	59.2	74.0	23.6	73.6	28.2	13.48	101.5	23.5	13.6	7.55		
AC-2	59.2	74.0	23.6	73.6	28.2	13.48	101.5	23.5	13.6	7.55		
Σ	118.4	1480	47.2	147.2	56.4	26.96	203.0	47.0	27.2	15.10		
S. P.	+3.6	-9.5		-8.0			+8.7					
AC-N	.02	.03		.02			.03					
Pot.Res.												

INDUCED POLARIZATION SENDER NOTES

Project: Mines FX Line: #5 N½ pp#2 Date: Jan 20 67

Send	½	⅔	½	¾	⅔	½	⅘	¾	⅔	½		
Receive												
Time												
Range												
Current	1½	1	1	1	1	1	1	1	1	1		
Send	⅘	¾	⅔	½	⅘	¾	⅔	½		⅘		
Receive												
Time												
Range												
Current	1	1	1	1	1	1	1	1		1		

INDUCED POLARIZATION SENDER NOTES

project: _____ Line: Line 5 SR 2 5 1/2 Date: _____

Send	4/5	3/4	4/5	3/5	3/4	4/5	1/2	2/3	3/4	4/5		
Receive	→	→	→	←	→	→	→	→	→	→		
Time												
Range												
Current												
Send	4/5	2/3	3/4	4/5	2/3	2/3	3/4	4/5		∞ 1-2		
Receive	←	←	←	←	←	←	←	←				
Time												
Range												
Current												

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page _____

Project Mines Ex Inc Line 5 Sp 1 Field date 19 Jan 67 Data page _____ Comp. date 20 Jan 67. Comp by JWL

5+

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	0-250	250-500	500-750	→			750-1000	→			1000-1250	
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1	→										
(E) Vdc (avg)	216	234	66.6	191.0	55.2	24.1	170.4	63.9	27.4	13.75	59.8	29.5
(F) DCcal	.505	→										
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5
(H) ρ dc=ExFxGx10^3/D	82	89	101	72	84	91	65	97	104	104	91	112
(I) Vac Σ	214	232	66.4	190	55.0	24	170	63.6	27.2	13.6	59.6	29.4
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1	→										
(M) ρ dc/ρac=ExL/K	1010	1010	1004	1005	100.5	1005	1002	1001	1007	1010	1002	1002
(N) PFE=(M-1)(10^2)	1.1	1.0	0.4	0.5	0.5	0.5	0.2	0.1	0.7	0.1	0.2	0.2
(O) MCF=(M-1)(10^5)/H	14	11	4	7	6	5	3	1	7	1	2	2

Project _____ Line _____ Field date _____ Data page _____ Comp. date _____ Comp by _____

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		Col				
(B) Receive	→		1250	-1500	→							
(C) n separation	4	5	3	4	5	6						
(D) I	→											
(E) Vdc (avg)	14.3	8.05	22.9	12.8	7.18	4.29		198				
(F) DCcal	→											
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	108	107	87	97	95	90						
(I) Vac Σ	14.2	8.04	22.8	12.8	7.16	4.28		198				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1008	1001	1003	0	1001	1001						
(N) PFE=(M-1)(10^2)	0.8	0.1	0.3	0	0.1	0.1						
(O) MCF=(M-1)(10^5)/H	9	1	3	0	1	1						

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Mines Ex Inc Line 5 Sp 1 N.E Field date 19 Jan 67 Data page_____ Comp. date 20 Jan 67 Comp by J.W.L

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-250N	250-500	→	500-750	→		750-1000	→	→	→	1000	1250
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1.5	1	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	362.5	210	65.4	224	64.6	28.7	266	81.9	37.9	19.35	74.6	34.3
(F) DCcal	1.5	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15	3	2.5
(H) ρ dc=ExFxGx10^3/D	91	79	98	84	97	108	100	123	142	145	112	129
(I) Vac Σ	359	208	64.8	222	64.4	28.6	262	81	37.6	19.2	73.6	34.2
(J) AC noise x 2	→	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	1	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1010	1010	1009	1009	1005	1004	1015	1011	1009	1009	1013	1007
(N) PFE=(M-1)(10^2)	1.0	1.0	0.9	0.9	0.5	0.4	1.5	1.1	0.9	0.9	1.3	0.7
(O) MCF=(M-1)(10^5)/H	11	13	9	11	5	4	15	9	7	7	12	8

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2		Cal				
(B) Receive	→	→	1250-1500	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	→	→	→	→	→	→						
(E) Vdc (avg)	19.95	10.80	26.55	14.4	9.44	5.60		200				
(F) DCcal	→	→	→	→	→	→						
(G) Kn x 10^{-3}	15	26.25	7.5	15	26.25	42						
(H) ρ dc=ExFxGx10^3/D	150	142	99	108	139	117						
(I) Vac Σ	18.8	10.78	26.6	14.4	9.36	5.60		200				
(J) AC noise x 2	→	→	→	→	→	→						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→						
(L) AC-DC cal.	→	→	→	→	→	→						
(M) ρdc/ρac =ExL/K	1008	1009	.998	0	1008	0						
(N) PFE=(M-1)(10^2)	0.8	0.9	-0.2	0	0.8	0						
(O) MCF=(M-1)(10^5)/H	5	6	2	0	6	0						

INDUCED POLARIZATION - RECEIVER NOTES

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DC-1	36.4 38.2	17.3 17.0	9.10 9.85	5.42 5.38	13.80 12.75	7.40 7.00	4.64 4.80	2.82 2.78		100 100		
DC-2	36.4 38.2	17.3 17.0	9.10 9.85	5.42 5.38	13.80 12.75	7.50 6.90	4.58 4.86	2.84 2.76		100 100		
Σ						14.4 14.4	9.44 9.44	5.60 5.60				
DC-3	36.4 38.2	17.3 17.0	9.10 9.85	5.42 5.38	13.80 12.75	7.60 6.80	4.52 4.94	2.86 2.74				
Dc-4						7.70 6.70	4.44 4.99	2.94 2.66				
Σ						14.4 14.4	9.46 3					
DC AV	74.6	34.3	19.95	10.80	26.55	14.4	9.44	560		200		
AC-1	36.8	17.1	9.40	5.39	13.3	7.2	4.68	2.80		100		
AC-2	36.8	17.1	9.40	5.39	13.3	7.2	4.68	2.80		100		
Σ	73.6	34.2	18.8	10.78	26.6	14.4	9.36	560		200		
S. P.	+0.9				-4.1							
AC-N	.02				.02							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES

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Time	300	300	100	300	100	30	300	100	30	30		
DC-1	181.5 181.0	105 105	32.0 33.4	111 113	34.2 30.4	14.3 14.4	132 134	42.3 39.6	19.0 18.9	9.70 9.65		
DC-2	181.5 181.0	105 105	32.0 33.4	111 113	34.2 30.4	14.3 14.4	132 134	42.3 39.6	19.0 18.9	9.70 9.65		
Σ												
DC-3	181.5 181.0	105 105	32.0 33.4	111 113	34.2 30.4	14.3 14.4	132 134	42.3 39.6	19.0 18.9	9.70 9.65		
Dc-4												
Σ												
DC-AV	362.5	210	65.4	224	64.6	28.7	266	81.9	37.9	19.35		
AC-1	179.5	104	32.4	111	32.2	14.3	131	40.5	18.8	9.60		
AC-2	179.5	104	32.4	111	32.2	14.3	131	40.5	18.8	9.60		
Σ	359.0	208	64.8	222	64.4	28.6	262	81	37.6	19.20		
S. P.	-0.7	-5.6		-6.4			-11.3					
AC-N	.03	.03		.03			.03					

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Time	300	300	100	300	100	30	300	100	30	30		
DC-1	108 108	117 117	34.4 32.2	95.0 96.0	27.2 28.0	12.1 12.0	85.2 85.2	32.0 31.9	13.6 13.8	6.90 6.85		
DC-2	108 108	117 117	34.4 32.2	95.0 96.0	27.2 28.0	12.1 12.0	85.2 85.2	32.0 31.9	13.6 13.8	6.90 6.85		
Σ												
DC-3	108 108	117 117	34.4 32.2	95.0 96.0	27.2 28.0	12.1 12.0	85.2 85.2	32.0 31.9	13.6 13.8	6.90 6.85		
Dc-4												
Σ												
DC-AV	216	234	666	191.0	55.2	24.1	170.4	63.9	27.4	13.75		
AC-1	107	116	33.2	95.0	27.5	12.0	85.0	31.8	13.65	6.80		
AC-2	107	116	33.2	95.0	27.5	12.0	85.0	31.8	13.65	6.80		
Σ	214	232	66.4	190.0	55.0	24	170.0	63.6	27.30	13.6		
S. P.	-4.5	+2.6		-2.5			+2.5					
AC-N	.03	.03		.02			.02					
Pot.Res.												

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Time	100	30	30	10	30	30	10	10		300		
DC-1	30.0 29.8	15.2 14.3	6.50 7.80	4.00 4.05	10.9 12.0	6.4 6.4	3.64 3.97 3.50 3.22	2.17 1.98 2.18 2.30		99 99		
DC-2	30.0 29.8	15.2 14.3	6.50 7.80	4.00 4.05	10.8 12.1	6.5 6.3	3.74 4.02 3.42 3.17	2.10 1.96 2.18 2.34		99 99		
Σ							7.14 7.19 7.16 7.19	4.35 4.28 4.28 4.30		198 198		
DC-3	30.0 29.8	15.2 14.3	6.50 7.80	4.00 4.05	10.7 12.2	6.6 6.2	3.82 4.06 3.38 3.12	2.05 1.92 2.22 2.38				
Dc-4							3.86 4.18 3.28 3.04	2.01 1.85 2.26 2.42				
Σ							7.20 7.18 7.14 7.22	27 30 27 27				
DC-AV	59.8	29.5	14.30	8.05	22.9	12.8	7.18	4.29		198		
AC-1	29.8	14.7	7.10	4.02	11.4	6.40	3.58	2.14		99		
AC-2	29.8	14.7	7.10	4.02	11.4	6.40	3.58	2.14		99		
Σ	59.6	29.4	14.20	8.04	22.8	12.80	7.16	4.28		198		
S. P.	+0.4				-3.9							
AC-N	.02				.02							
Pot.Res.												

INDUCED POLARIZATION SENDER NOTES

project: Mines Ex inc Line: Line #55 A1 S 1/2 Date: 1/19/67

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Time												
Range												
Current												
Send	1/2	2/3	3/4	4/5	1/2	2/3	3/4	4/5		Line 1/2		
Receive												
Time												
Range												
Current												

INDUCED POLARIZATION SENDER NOTES

project: Minestx Inc Line: Line #5 SP.1 N½ Date: 1-19-87

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Time												
Range												
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Send	⅘	¾	⅔	½	⅘	¾	⅔	½		⅘		
Receive										CK'		
Time												
Range												
Current	1	1	1	1	1	1	1	1		1		

THE ESCAPULE MINE, DRAGOON MOUNTAINS MINING DISTRICT COCHISE COUNTY, ARIZONA

A Preliminary Report

by

John N. Faick, Ph.D.
Registered Geologist

Prepared for

Mine Exploration Company, Inc.
3130 East Grant Road
Tucson, Arizona 85716

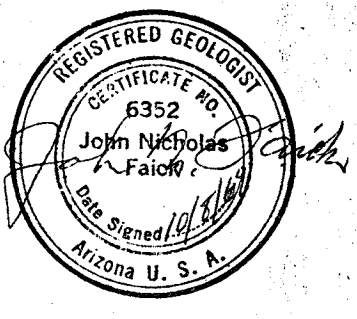

TABLE OF CONTENTS

ILLUSTRATIONS

TABLES

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The Escapule mining property, consisting of 17 unpatented mining claims, is situated about 12 miles northeast of Tombstone, Arizona. The claims cover three mineralized zones, two of which have been developed by a few hundred feet of mine workings. About 5,000 tons of good quality zinc-lead-silver ore has been developed by the underground workings known as the Moonlight mine, and about one mile west-southwest of it nearly similar ore is exposed in small prospects on the Garner 8 claim. Extending south of this claim for a distance of about one-half of a mile, and adjoining the old Silver Cloud mine is an extensive zone in which assays on 235 samples indicate rich silver ore in small lenses, pods and veinlets widely distributed throughout an extensive block of limestone.

The zinc-lead-silver deposits on Escapule's claims are sufficiently large and rich to justify further exploration with reasonable expectations of finding considerable ore suitable for underground mining. The silver-bearing area may contain enough silver throughout a sufficiently large zone to be mined by modern open pit methods. It should be explored with this as an objective.

All of the ore on the Escapule property occurs in folded and faulted Paleozoic limestone in the hanging wall side of the prominent Dragoon fault. A large block of this limestone extending south and west of the Moonlight mine is geologically favorable for the occurrence of additional ore bodies like those presently known. The writer recommends that this block of limestone be thoroughly explored with modern methods, beginning at or near any one of the three potentially productive ore zones already known.

THE ESCAPULE MINE, DRAGOON MOUNTAINS MINING DISTRICT, COCHISE COUNTY, ARIZONA

A Preliminary Report
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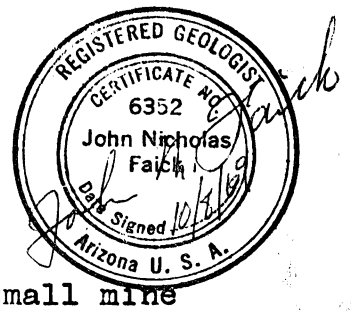
Registered Geologist



INTRODUCTION

Mr. Joe M. Escapule of Tombstone, Arizona owns a small mine situated in the Dragoon Mountains Mining District about 12 airline miles northeast of the famous old silver mining community of Tombstone. This mine, which is located on 17 contiguous unpatented claims is locally well known for its good quality sulfide ore containing lead, zinc, copper and silver. The mine has been developed largely since World War II by about 400 feet of underground workings and by several shallow cuts on the surface. These workings are located high on the northwest slope of Black Diamond Mountain, principally on an unpatented claim known as the Moonlight No. 2, and the adjacent Moonlight No. 3 claim. In the report which follows this will be referred to as the Moonlight Mine.

About one-fourth of a mile north of the Moonlight Mine are some old mine workings from which several railroad cars of high-grade copper ore reportedly were shipped many years ago. We have no record of this work and the area will not be discussed in this report.

About one mile southwest of the Moonlight workings, on another part of Escapule's group of claims, is an area in which some rich silver ore was developed on a small scale, and a few small shipments of high-grade ore were made many years ago. Escapule controls this area with the Garnet group of unpatented claims, but during the 1920's and 1930's the claims were known as the Silver group and as the Arizona group. A large amount of sample and assay data is available which can be correlated by use of the earlier claim names, therefore, these will be retained for use in this report, but the area will also be referred to as the Garnet claims and as the Silver mine area. This area adjoins the north side of the Silver Cloud patented claim from which some silver ore has been produced. On the Garnet 8 claim, about one-half mile north of the Silver Cloud claim is another intensely mineralized zone in which some high-grade zinc ore containing good values in silver is exposed in two short tunnels and several shallow prospect pits. Thus, there are four well mineralized zones on the Escapule claims of which three will be considered in this report.

The writer has visited the Moonlight mine a number of times over a period of about 15 years and examined the Silver mine area and the zinc ore zone on the Garnet 8 claim for the first time on September 30, 1969

LOCATION, ACCESSIBILITY AND TOPOGRAPHY

The Escapule mine, or Moonlight mine, is shown on the U. S. Geological Survey topographic map of the Pearce quadrangle and

on figures 1 and 2 of this report. It is located near Middle Pass in the Dragoon Mountains. The mine is reached from Tombstone by driving north two miles on Highway 80, thence following the Pearce road to a right turn-off in the vicinity of Middle Pass. From the turn-off it is about one mile south to the mine and a loaded pickup truck or 4-wheel drive vehicle should be used over this last mile. To reach the Silver area on the Garnet group of claims it is necessary to turn off the Pearce road where crossed by a power line and follow it south a short distance to a jeep road which ascends a gentle slope to the mines which are located low on the west slope of the Dragoon Mountains. From the Silver area the outcrops of rich zinc ore on the Garnet 8 claim can be reached by driving northward a short distance over a rough jeep trail that follows along the fence line on the west side of Section 25, thence driving northeast up a dry arroyo.

The Escapule mine (Moonlight workings) is located near the east side line of Sec. 24, T. 18 S., R. 23 E., Gila and Salt River Base Meridian, and the claims extend southwestward into Section 25 and southeastward in to an unsurveyed area equivalent to Sec. 19, T. 18 S., R. 24 E. The mine is at an altitude of about 6,500 feet on the steep northern slopes of Black Diamond Peak and is about three-fourths of a mile northwest of the Black Diamond Copper-iron mine. The Garnet claims or Silver mine area is on the west slope of the Dragoon Mountains at an altitude of about 5,800 feet or about 700 feet lower than the Moonlight workings.

POWER, WATER AND TRANSPORTATION

Natural gas and electric power are available in Tombstone and a 115 KV transmission line passes about midway between Tombstone and the mine. (See figure 1) Water is relatively scarce at the mine and the nearest industrial supply is at the San Pedro River a few miles west of Tombstone. The area is served by good roads and rail facilities are available on the Southern Pacific Railroad which follows along the San Pedro River and joins the main line at Benson.

HISTORY AND OWNERSHIP OF THE PROPERTY

The Escapule group of claims consist of 17 contiguous claims known as the Moonlight 1, 2 and 3; Northside 1, 2 and 3; Garnet 1 and 2; Garnet 4 thru Garnet 12. Garnet 3 was not recorded. Joe M. Escapule and his wife Marghriet, Tombstone, Arizona, are the sole owners of the claims.

Ore was discovered near the site of the Moonlight mine workings by Joe Escapule about 1925. He and his brother Ernest then located claims on the discovery but these claims were allowed to lapse. Then about 1935 Joe Escapule relocated the claims and has maintained them by doing the required annual assessment work and developing his mine since that date. The presently active workings of the Escapule mine are located principally on the Moonlight No. 2 claim and to some extent on Moonlight No. 3.

The Garnet group of claims, first known as the Silver group and later as the Arizona group, are much older than the Moonlight claims. The Silver group was first located about the time of World

War I by the late Jonathan Gordon, Mining Engineer, and Ernest Escapule, and then they were relocated as the Arizona group by which name they were known in 1932. The claims were allowed to lapse during the late 1930's and in 1942 Joe Escapule located the Garnet group of claims over the same area. All of these unpatented claims have been maintained by annual assessment work and development work. The relative position of the claims in the Silver, Arizona and Garnet groups is shown on figure 3.

PRODUCTION

Several small shipments of selectively mined ore have been produced from the Silver area but records of only three of these are available. One of these shipments amounted to 8 tons of high-grade silver ore which yielded a net smelter return of about $3,700. The two other shipments amounted to 4.8 and 27.2 tons of ore containing 0.88 and 0.32 ounces of gold; and 66.4 and 28.0 ounces of silver respectively. These shipments and a large number of assays are reported in greater detail in the descriptions of the mine areas.

At the Moonlight mine some ore has been stockpiled on the dump but none has been sold and no ore has been produced from the zinc deposit on the Garnet 8 claim. It is reported that several railroad cars of copper ore were shipped many years ago from a small mine located about one-fourth of a mile north of the Moonlight mine but there is no record of this production.

In the Dragoon Mountains district, within 2 or 3 miles of the Escapule mine, considerable ore has been produced from several small mines. The Abril and San Juan (Jonathan Gordon) mines yielded significant tonnages of zinc ore and copper ore was produced from the nearby Middlemarch mine. The Black Diamond mine, which is located about three-fourths of a mile southeast of the Moonlight mine yielded high-grade copper ore from an impressive mineralized zone consisting mostly of magnetite and garnet. This copper ore was treated at a small smelter located about one mile east of the mine. The Silver Cloud mine reportedly yielded some selectively mined high-grade ore valued at a little more than $100,000.

The Cretaceous and older rocks are intruded by a number of igneous bodies of which the Stronghold granite is the largest and most widespread. It underlies an area of about 50 square miles in the northern part of the Dragoon Mountains, just north of the Middle Pass area under consideration in this report. Large dikes related to the Stronghold granite were mapped by Gilluly (1956) south of the Middle Pass area, especially in the vicinity of the Black Diamond mine and southeast of it. (See fig. 4). The Stronghold granite and the great dikes related to it are of Tertiary age according to Gilluly.

A small quartz monzonite intrusive, named the Cochise Peak quartz monzonite, extends northwestward from a point about one mile northwest of the Escapule mine. (See fig. 4). It was mapped by Gilluly (1956) and is regarded by him as belonging to a group of intrusives of Triassic-Jurassic age.

The close relationship of these igneous intrusives and the mineralized zones developed by the mines was observed by Wilson (1951, p. 12). He noted that the zinc-lead-silver ore at the nearby Abril and San Juan mine and mines in the Courtland-Gleeson district are relatively near such intrusive masses. No large bodies of igneous rocks are known within about one mile of the Escapule mine but the ore presumably is related either to the Cochise Peak quartz monzonite of Triassic-Jurassic age or to the major dikes associated with the Cochise Stronghold granite of Tertiary age. The zinc silver ore on the Garnet 8 claim is closely related to some dark greenish gray fine-grained dikes. The age of the ore and the igneous rock to which it is genetically related is at present unknown.

GENERAL GEOLOGY

Rocks

The geology of the Dragoon Mountains has been described in three published reports listed in the attached bibliography as follows: (1) Gilluly, Cooper and Williams (1954), (2) Gilluly (1956) and Wilson (1951). This published literature was freely used by the writer in preparation of the present report.

The generalized stratigraphic column and igneous history of the Dragoon Mountains is remarkably similar to that at Tombstone, Johnson Camp, Swisshelm and other productive mining districts in Cochise County. The oldest rock in the Middle Pass area is Precambrian schist with which is associated some granitic-type intrusive rocks. These schistose and granitic rocks form the basement rocks upon which extremely thick Paleozoic and Mesozoic sedimentary rocks have been deposited. (See fig. 4 and 5). Paleozoic formation represented in the Middle Pass area is the Bolsa quartzite of Middle Cambrian age, and which is about 300 feet thick. Deposited upon this in sequence are the Cambrian Abrigo limestone, Devonian Martin limestone, Mississippian Escabrosa limestone and several formations of the Naco group of Pennsylvanian and Permian age. Resting unconformably upon the Paleozoic formations is a thick series of sedimentary rocks consisting of shale, sandstone and conglomerate which represents the Bisbee group of Cretaceous age. The generalized sequence of rocks in the Middle Pass area, which was abstracted and modified from Gilluly (1956, p. 8) is shown on table 1.

Structure

The structural geology in the vicinity of the Escapule mine is exceedingly complex and the best possible interpretation of it was given in the notable report by Gilluly (1956) from which most of the following information was abstracted. The structural conditions are illustrated by the geologic map shown in figure 4 and Gilluly's geologic sections which are reproduced in figures 5-A, 5-B and 5-C. According to Gilluly most of the deformation is post Cretaceous in age and the most conspicuous structural feature is the Dragoon fault. This is a high-angle reverse fault which trends northwesterly and dips southwest about 60-70 degrees. Near its northern end in Section 14, about one mile west of Middle Pass the displacement on the fault is about 100 feet but it increases markedly toward the south. In the Escapule and Black Diamond Peak areas the fault clearly separates the Paleozoic limestones on the west or hanging wall side from the Cretaceous Bisbee formation in the footwall or eastern side of the fault.

Between the Escapule and Festerline mines (fig. 4) the Dragoon fault is offset by a steep easterly-trending fault, the only break in its continuity for several miles. South of this transverse fault the Horquilla limestone (Parmian) wedges out between the fault and a thrust plate of Escabrosa limestone, but the Horquilla makes its appearance again about one-fourth of a mile farther south. The formations referred to cannot be separated on small scale maps, therefore, they are lumped together as undifferentiated Paleozoic limestones as shown on figure 4.

There are numerous thrust faults that slice the Cretaceous and older rocks east and southeast of the Escapule mine. With the exception of the west dipping Dragoon fault the thrust faults strike northwesterly and dip easterly with the overthrust displacement from the southwest toward the northeast. These thrust faults caused a repetition of thin thrust slices and a thickening of the formations. Pronounced folding of the stratified rocks accompanied or preceeded the thrust faults, and the beds of the Bisbee formation in the footwall of the Dragoon fault have been overturned.

The summit of Black Diamond Peak is a fault outlier or thrust block of Escabrosa limestone, however, this is not shown on the small scale map, figure 4, but is suggested by Gilully's Section VIII, shown in figure 5-B. West of Dragoon Camp Gilluly reports that a still higher thrust fault forced Colina limestone over the Borquilla limestone and forms the hanging wall segment of the Dragoon fault.

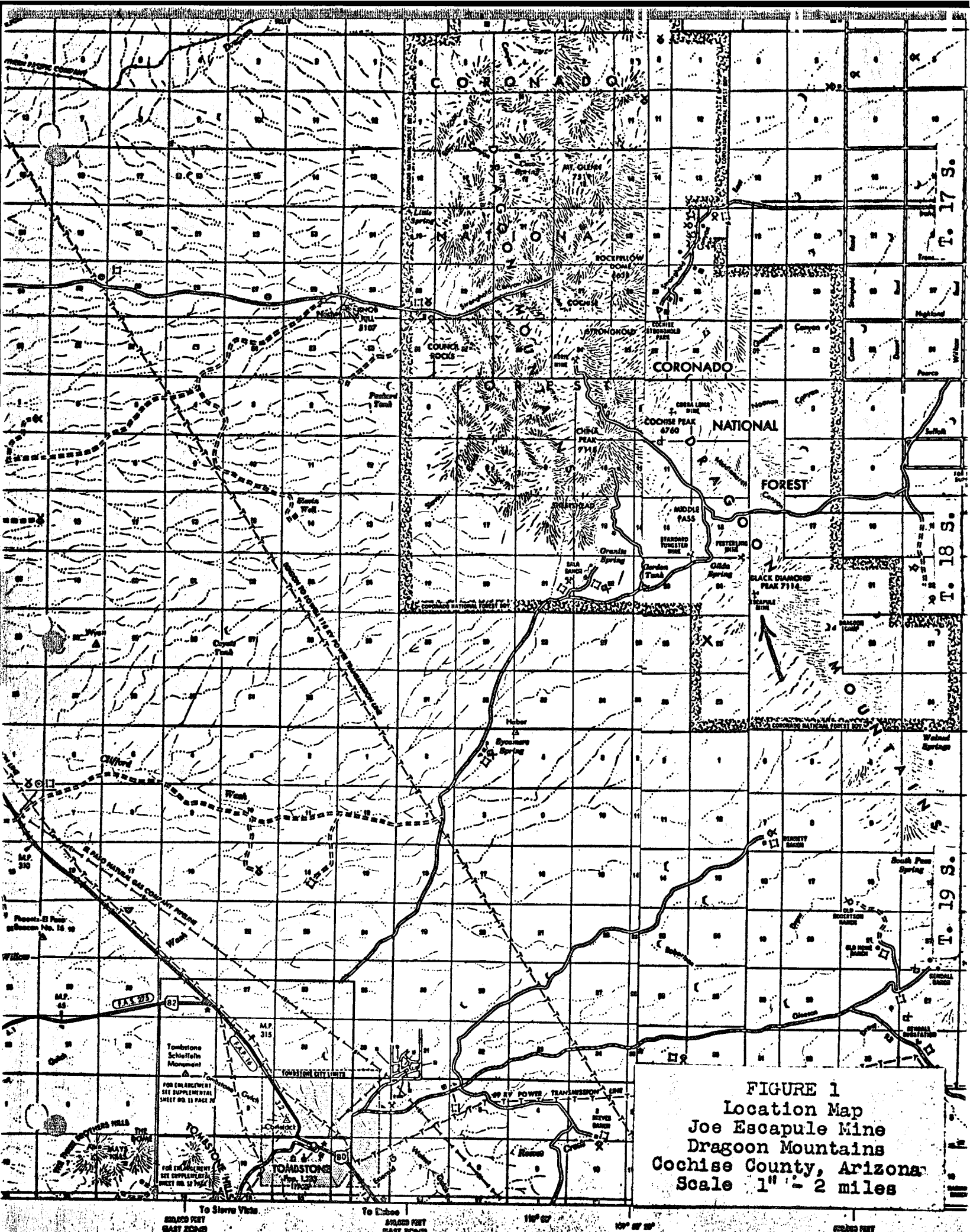


FIGURE 1
Location Map
Joe Escapule Mine
Dragoon Mountains
Cochise County, Arizona
Scale 1" = 2 miles

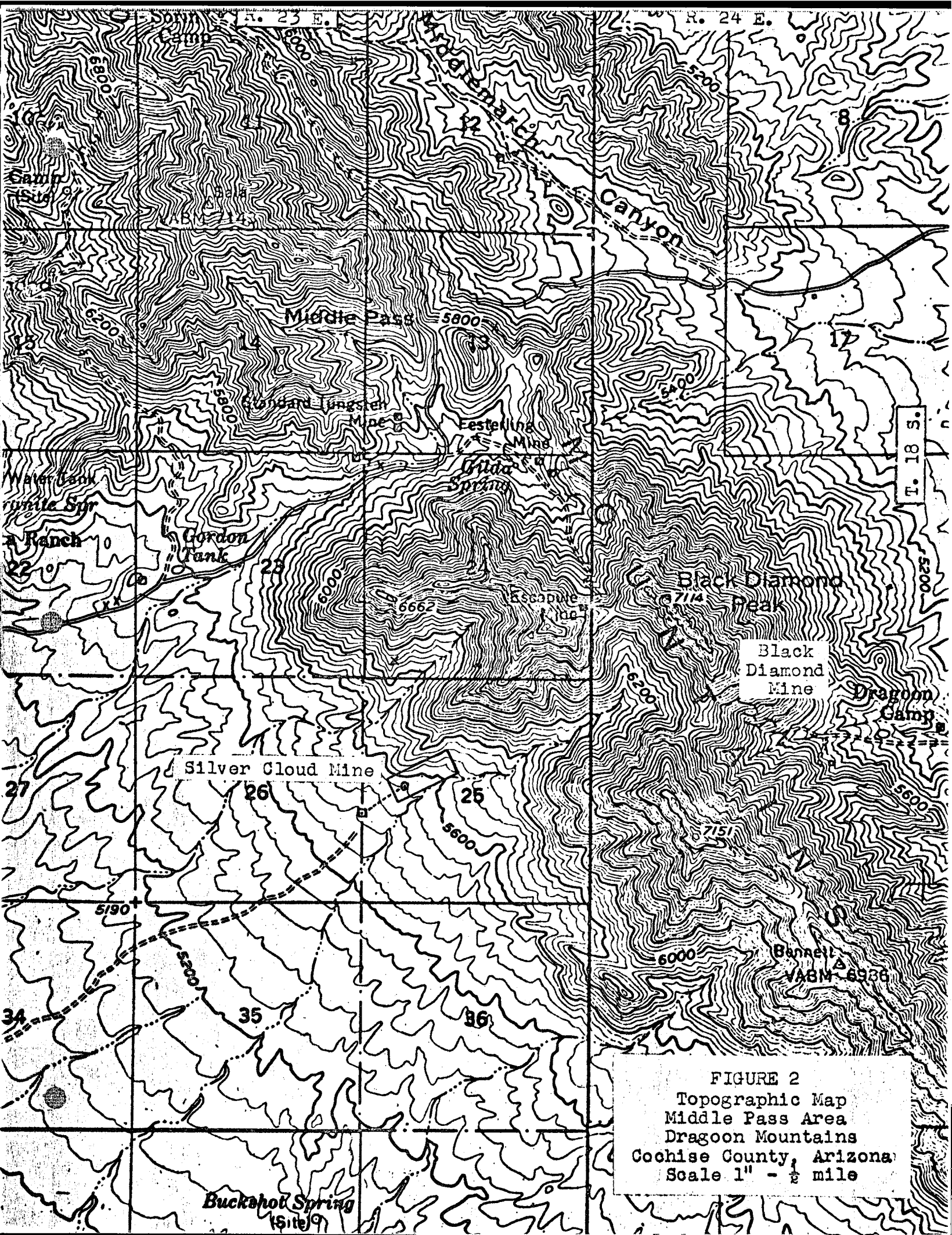


FIGURE 2
Topographic Map
Middle Pass Area
Dragoon Mountains
Cochise County, Arizona
Scale 1" - ½ mile

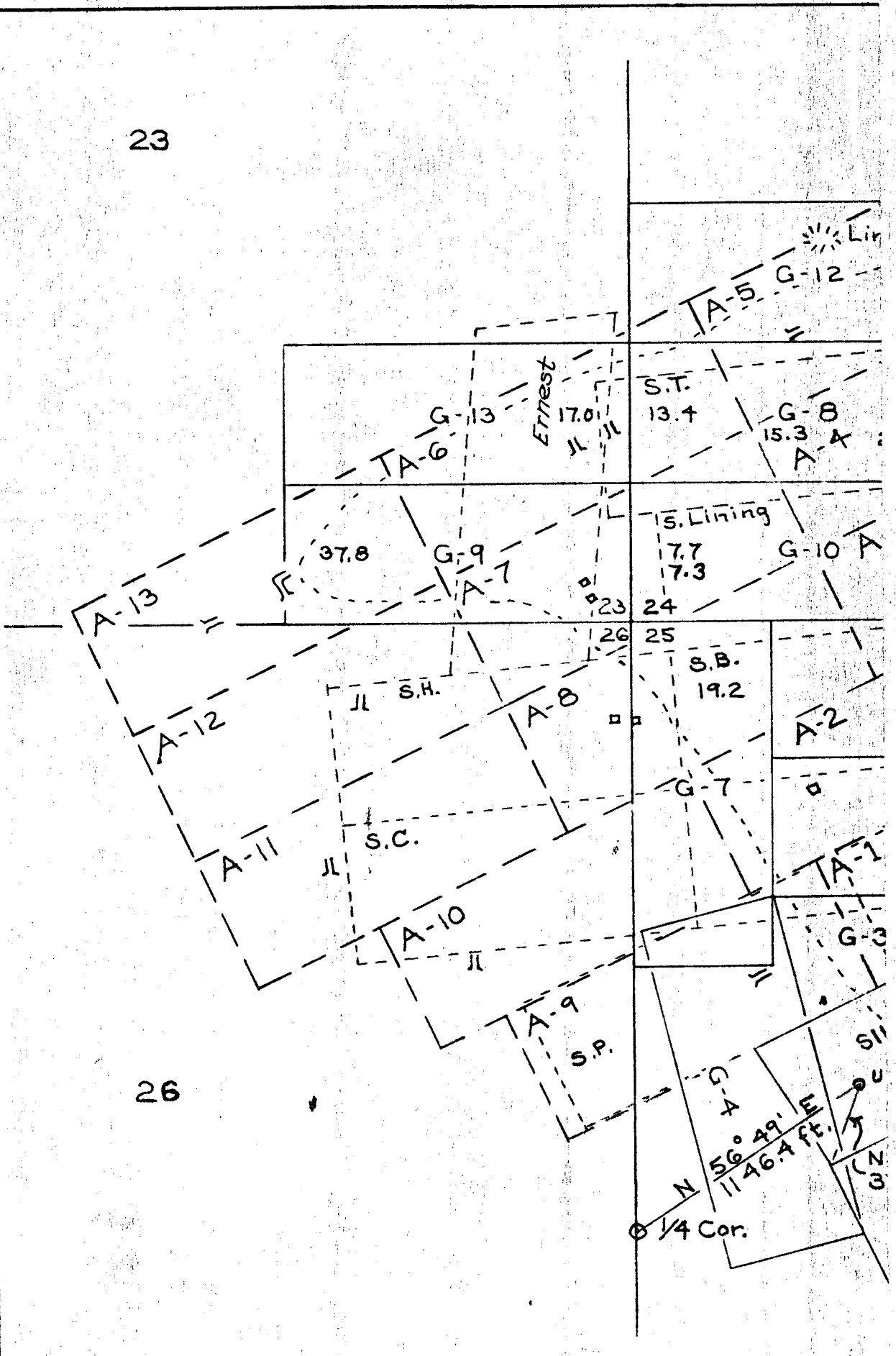


FIG. 3; COMPOSITE CLAIM MAP; SOUTH

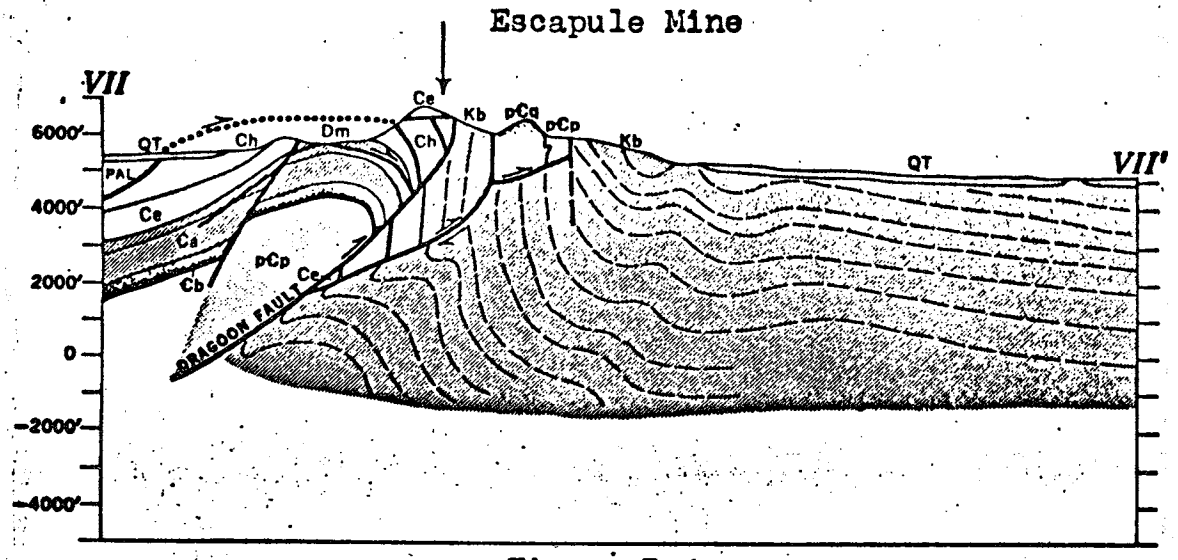


Figure 5-A

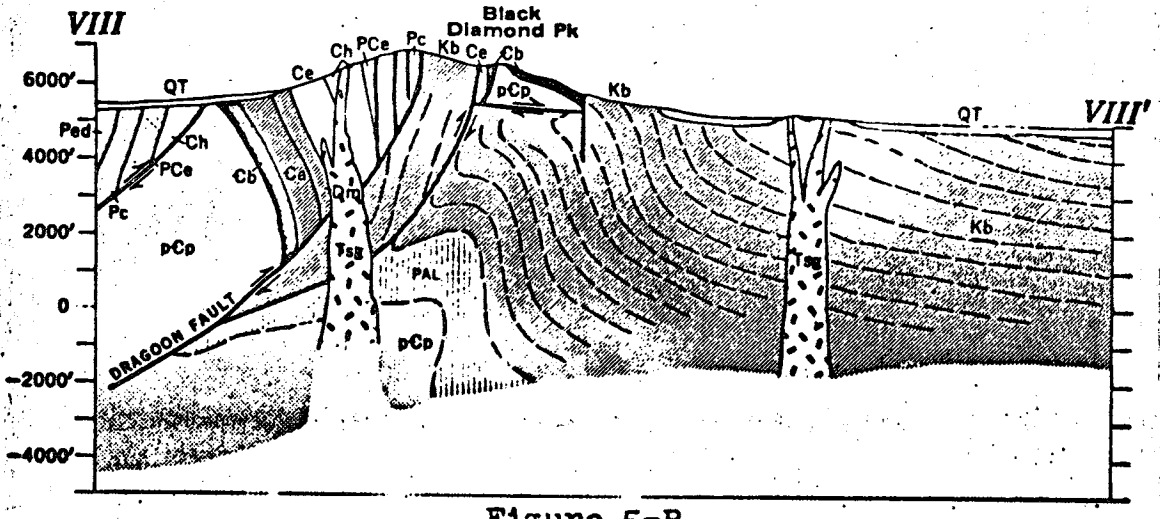


Figure 5-B

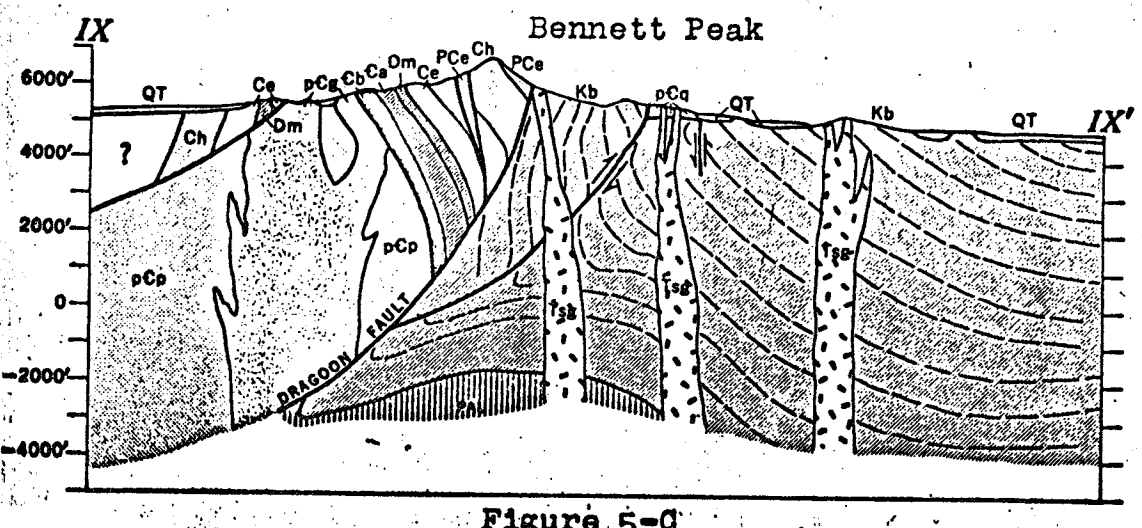


Figure 5-C

Figure 5. Gilluly's Geological Sections VII, VIII and IX

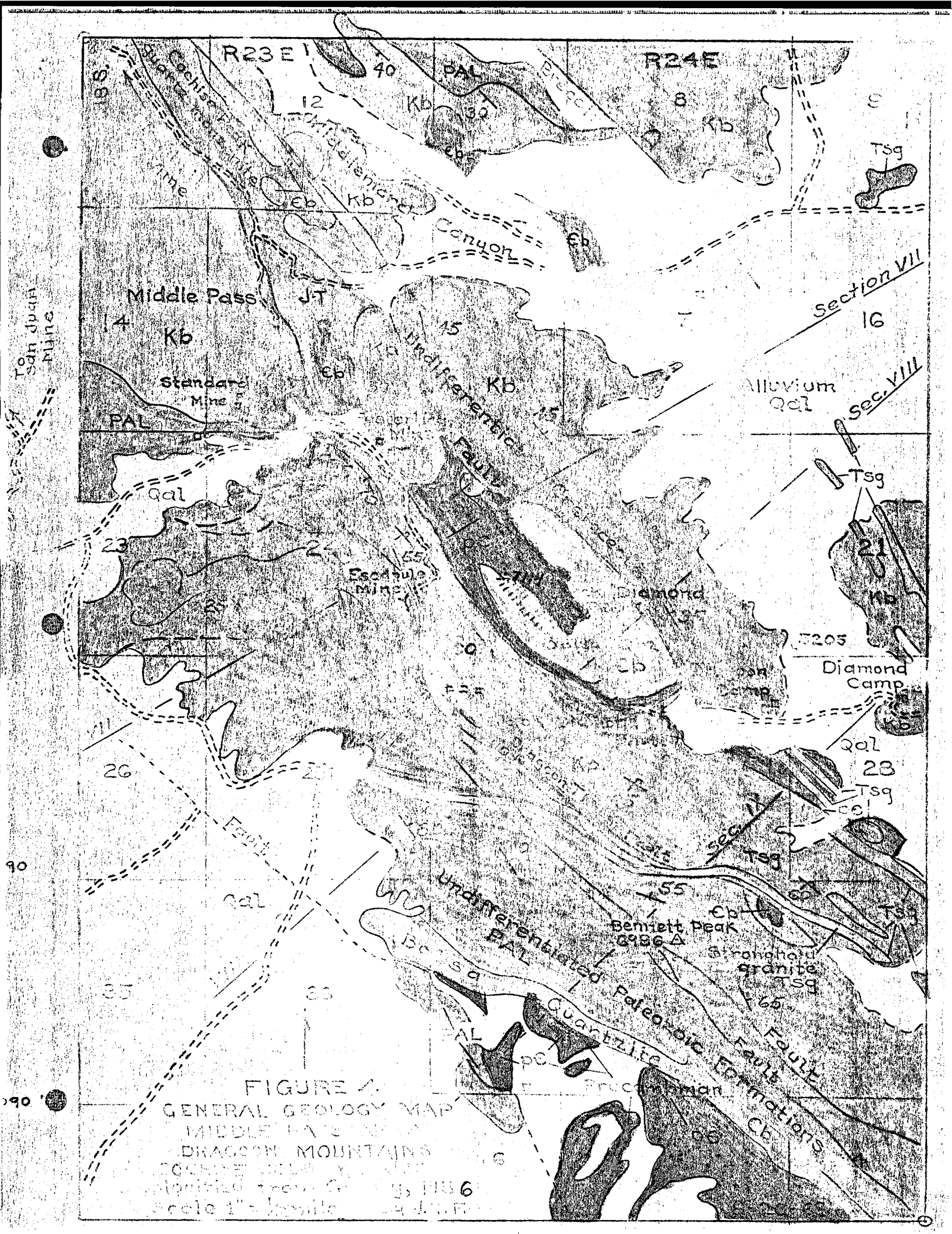
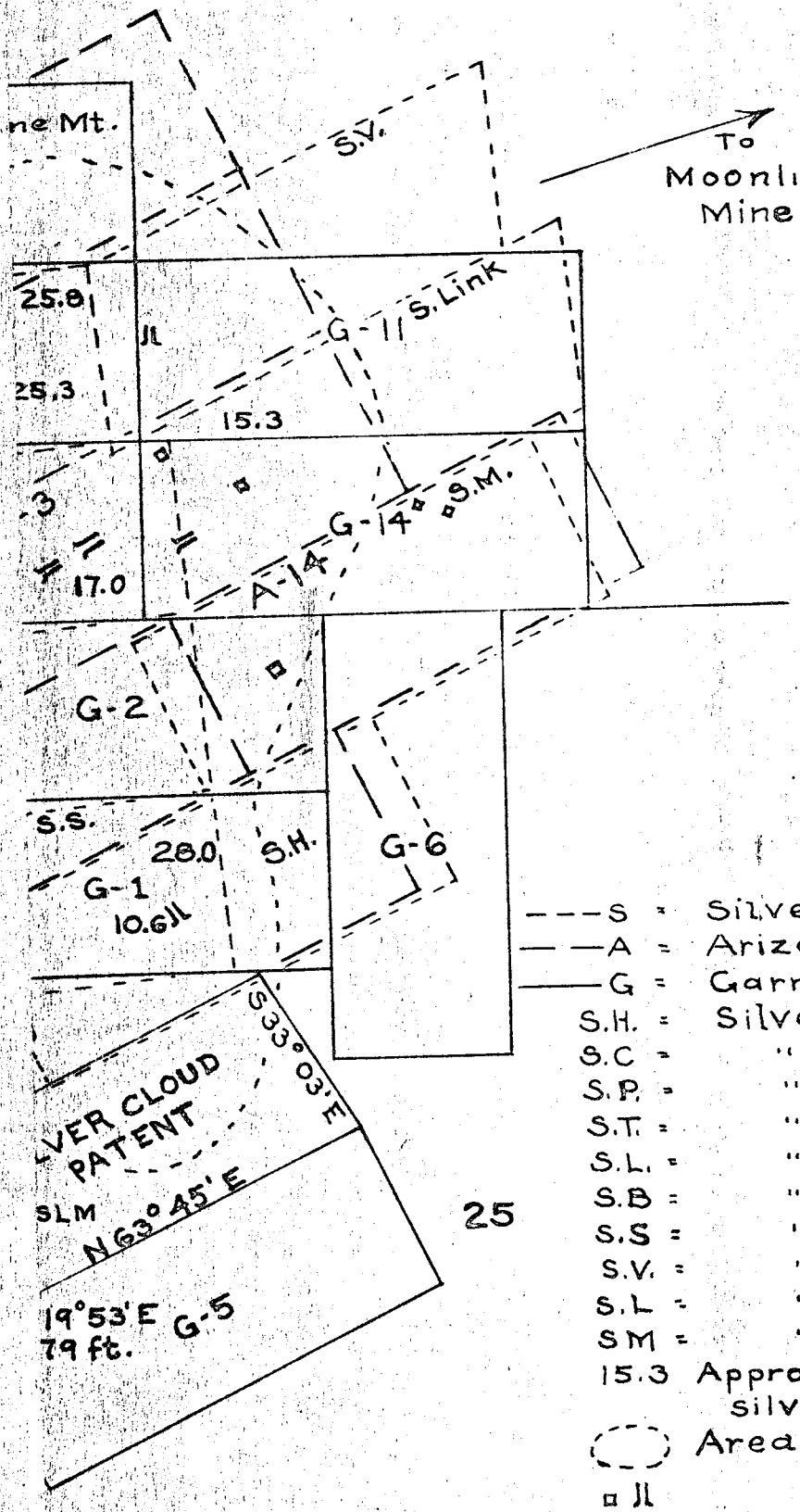


FIGURE 4
GENERAL GEOLOGY MAP
MIDDLE PASS
DRAGOON MOUNTAINS
COCHISE COUNTY
ARIZONA
Scale 1" = [illegible]



LEGEND

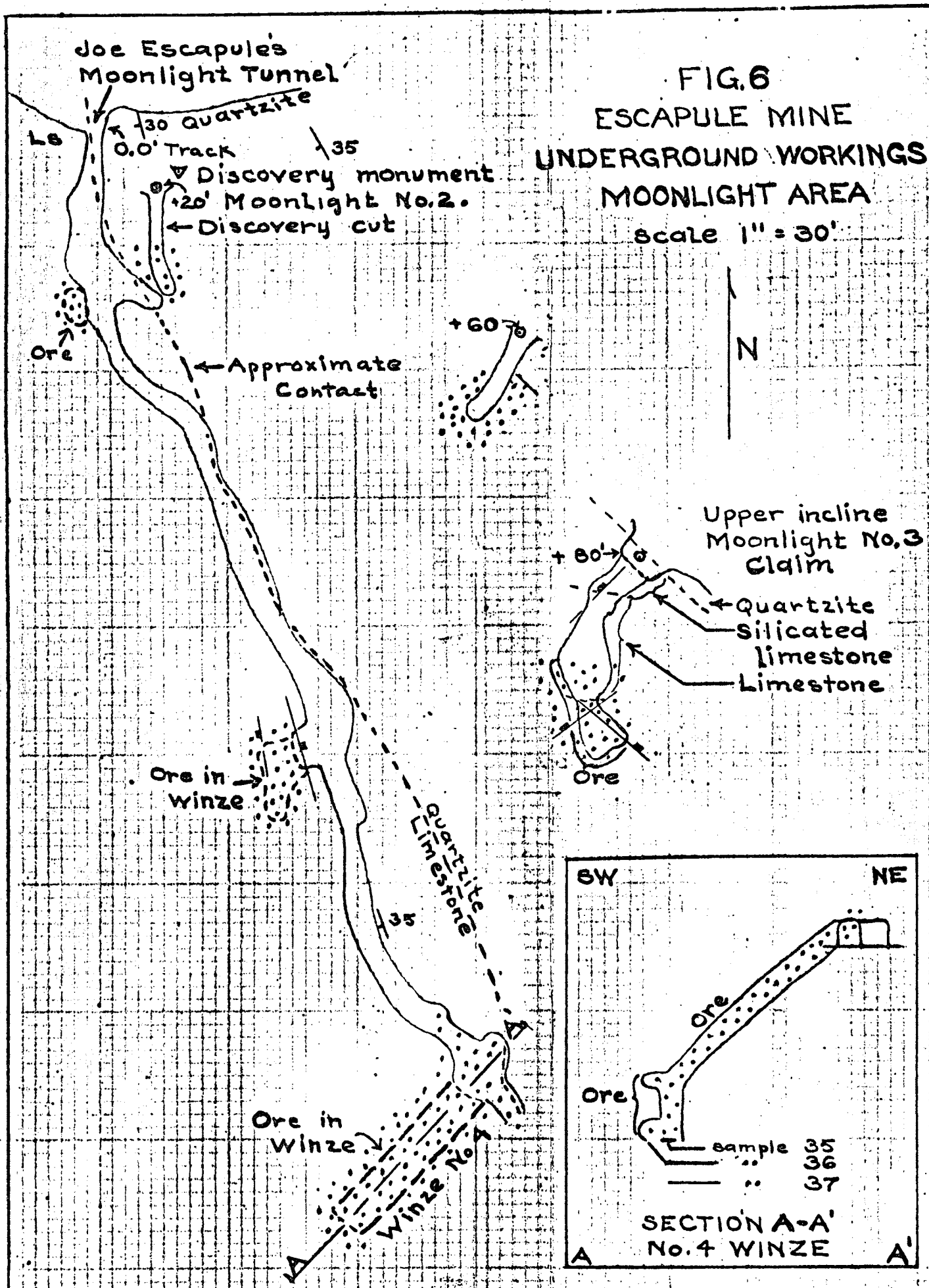
---S	=	Silver Group	1920 - 1930
— —A	=	Arizona Group	1930 - 1940
——G	=	Garnet Group	1942 - 1969
S.H.	=	Silver Hill	
S.C	=	" Chain	
S.P.	=	" Point	
S.T.	=	" Thread	
S.L.	=	" Lining	
S.B	=	" Bearing	
S.S	=	" Sheen	
S.V.	=	" Vein	
S.L	=	" Link	
SM	=	" Moon	

15.3 Approximate location average silver assays by claim.

Area of silver anomaly

JL

WESTERN PART OF ESCAPULE PROPERTY



Mapped 1955, 1964

TABLE 1 - GENERALIZED SEQUENCE OF ROCKS IN THE MIDDLE PASS AREA

Age	Formation or Rock type	Description
Quaternary	Alluvium and Gila Conglomerate	Young sediments and volcanic flows.
- - Unconformity		
Tertiary	Igneous intrusions	Stronghold granite and related dikes, and Schieffelin granodiorite near Tombstone.
Cretaceous	Igneous intrusions and flows	Not observed in Middle Pass area.
- - Unconformity		
Cretaceous	Bisbee formation or group	Sandstone, mudstone and conglomerate several hundred feet thick; much faulted.
- - Unconformity		
Triassic-Jurassic	Igneous intrusives	Cochise Peak quartz monzonite and other intrusives at Tombstone and Gleeson.
Permian-Pennsylvanian Naco Group	Epitaph dolomite	Dolomite exposed only in thin fault slices; a few score feet thick.
Ditto	Colina limestone	Dark gray, fine grained limestone a few score feet thick; faulted.
Ditto	Earp formation	Limestone and shale several score feet thick; faulted.
Ditto	Horquilla limestone	Light gray to pink limestone some crinoidal beds; several hundred feet thick.
Mississippian	Escabrosa limestone	Massive crinoidal limestone several hundred feet thick.
Devonian	Martin limestone	Limestone, shale and sandstone; a few score feet thick; faulted.
Cambrian	Abrigo quartzite	Limestone, shale, sandstone and some edgewise conglomerate 636 feet thick.
Cambrian	Bolsa quartzite	Quartzite and conglomerate 300 feet thick.
- - Unconformity		
Precambrian	Basement rocks	Schist and gneissic granite.

TABLE 2 - LIST OF ASSAYS FROM MOONLIGHT WORKINGS - ESCAPULE MINE

Sample Number	Date	Assay Office	Sampled by	Gold oz./ton	Silver oz./ton	Copper Percent	Lead Percent	Zinc Percent	Total combined Lead, Zinc, Copper deposits
1	7/23/46	Shattuck-Denn	Higgins	0.01	14.60	-	4.75	11.20	15.95
2	"	"	"	0.01	2.40		13.30		
3	1/12/49	Gordon	Escapule	Tr.	6.62	Tr.	0.50	7.70	8.20
4	"	"	"	Tr.	0.18	Tr.	0.50	15.80	16.30
5	11/23/49	"	"	0.06	5.94	0.27	0.30	8.4	8.97
6	"	"	"	0.01	1.0	0.22	0.25	3.66	4.13
7	"	"	"	0.04	3.0	0.54	0.25	6.87	7.66
8	"	"	"	Tr.	2.6	0.41	0.80	7.35	8.57
9	10/4/50	"	"	0.12	46.80	0.30	0.44		
10	"	"	"					21.4	
11	10/22/50	"	"	Tr.	4.80		0.22	11.55	11.77
12	"	"	"	Tr.	3.20		0.20	4.20	4.40
13	"	"	"	0.02	1.20		0.30	3.98	4.20
14	"	"	"	0.02	24.20		5.85	4.80	10.65
15	"	"	"	Tr.	6.04		0.30	12.00	12.30
16	"	"	"	Tr.	1.20		0.25	9.15	9.40
17	"	"	"	Tr.	3.20		3.53	7.20	10.73
18	11/18/50	"	"	Tr.	4.08	6.5	1.04	21.0	22.04
19	12/12/50	"	"	0.02	52.00		11.10	22.50	33.60
20	"	"	"	0.06	50.20		11.10	22.70	33.80
21	Dec. 1950	ASARCO	"		5.00		4.5	10.0	14.50
22	5/10/54	Hawley	"	Tr.	5.2	0.42	4.6	6.2	11.22
23	2/12/55	Jacobs	Lamm	0.01	7.8	1.27	3.5	7.5	12.27
24	"	"	"	0.02	16.0	2.36	5.5	14.7	22.56
25	"	"	"	0.01	7.8	0.21	8.7	12.3	21.21
26	"	"	"	0.01	8.3	0.09	2.5	11.5	14.09
27	8/24/55	USBM	USBM	Tr.	3.4	0.21	1.7	5.1	7.01
28	"	"	"	Tr.	1.9	0.16	1.7	3.7	5.56

ECONOMIC GEOLOGY OF THE MINE AREAS

Moonlight Mine Area

The Escapule mine is situated on the Moonlight 2 and 3 claims near the nead of a small canyon that drains the steep north slope of Black Diamond Peak. The mine lies a couple hundred feet west of the Dragoon fault where beds of Cretaceous shale and sandstone on the east side are in contact with Paleozoic limestones on the west side of this west dipping fault.

The Escapule mine is developed on an ore zone which lies along a normal bedding contact between a footwall zone of fine grained sandstone or quartzite and a hanging wall of gray limestone. The strata strike about N. 20 degrees W. and dip about 35 degrees SW. The limestone is believed to be the Horquillo formation of the Naco group but the presence of sandstone suggests that it may represent the Earp formation. There is a possibility that the beds are overturned because the nearby Cretaceous beds are overturned along the Dragoon fault and the limestones may have participated in the same structural deformation. The limestone is a good host rock for replacement type ore bodies.

The Escapule mine is developed by an adit about 275 feet long and by four shallow winzes numbered consecutively from the portal of the adit. (See fig. 6). These shallow winzes were sunk to explore the downward extensions of ore exposed in the adit and are respectively about 10, 17, 25 and 70 feet deep. All of the underground workings were driven along or near the contact between the quartzite and the limestone referred to above. The strata appear to be slightly warped so that the 35 degree westerly dip is not uniform throughout the mine. The strata are also slightly broken by numerous small fractures and minor faults. Most of the faults seem to be nearly parallel to the strata in the adit but in the winzes the faults steepen and transect the strata at a small angle. One of the more obvious faults is exposed near the portal of the adit but none can be easily traced in the underground workings.

The lead-zinc-copper and silver ore bodies have formed by replacement of limestone just above the fine grained quartzite that forms the footwall of the ore zone. The ore minerals are principally sphalerite, galena and minor amounts of chalcopyrite. The manner in which the silver occurs is not yet known. The gangue minerals are principally lime-magnesia silicates occurring as greenish, radiating, elongate crystals which are assumed to be hedenbergite or hornblende. These lime-magnesia silicates form in a narrow zone that is more-or-less continuous along the base of the limestone or within a few feet of the underlying quartzite.

TABLE 3 - Description of samples indicated on Table 2
Moonlight workings Escapule Mine

No.	Description
1	25-foot incline shaft
2	Surface lead
3	Upper incline
4	Lower incline
5	Lower adit, 1 ft., Sample 3
6	" " 6 in., " 1
7	" " 3 ft., " 4
8	" " 2 ft.
9	Upper incline shaft
10	" " " , specimen
11	Lower adit, east side, down from winze
12	Ore in bin from face of lower adit and in winze at end
13	Ore in epidote gangue, $2\frac{1}{2}$ ft. picked
14	Upper incline shaft to east side
15	" " " " " " , $2\frac{1}{2}$ ft. picked siliceous ore
16	" " " , zinc ore picked from $2\frac{1}{2}$ ft. sample
17	Lower adit (?). Starts at truck level.
18	No description
19	Upper incline shaft, sulfide ore
20	" " " , carbonate and sulfide mixed
21	Mixed ore and waste in dump from lower adit
22	No description
23	Track level Lower adit
24	Winze, 4-ft. face, Lower adit
25	Winze, Lower adit
26	Upper shaft
27	Stockpile of ore on dump of main adit
28	Ore in bin, probably from No. 4 winze
29	Stockpile of ore on dump of main adit, from No. 4 mine
30	Hanging wall, lower adit, 2-ft.
31	" " " " 3-ft.
32	Clean ore collected from along ore zone, lower adit
33	Muck pile representing ore from No. 4 winze at depth of 37 to 41 feet, two feet above footwall
34	Muck pile representing ore from No. 4 winze at depth of 37 to 41 feet, hanging wall zone
35	Ore from 2 to 5 ft. west of No. 4 winze at depth of 62 feet
36	Hanging wall of No. 4 winze at depth of 62 feet
37	Stub crosscut in hanging wall of No. 4 winze, sample cut 10 ft. from foot wall of winze.

TABLE 2 - LIST OF ASSAYS FROM MOONLIGHT WORKINGS - ESCAPULE MINE - Cont'd

Sample Number	Date	Assay Office	Sampled by	Gold Oz./ton	Silver Oz./ton	Copper Percent	Lead Percent	Zinc Percent	Total combined Lead, Zinc, Copper Deposits
29	2/21/56	ASARCO	Escapule	Tr.	2.5	0.34	1.74	4.67	6.84
30	7/17/59	Valley Lab.	"	0.02	10.80	4.25	14.4	7.3	25.95
31	"	"	"	0.02	4.10	3.7	7.3	3.6	14.60
32	12/28/62	Arizona Testing Lab.	Consolidated Minerals,Inc.	0.04	19.6	1.8	15.7	17.8	35.30
33	3/14/63	Jacobs	Faick and Escapule		4.2	0.14	2.8	4.3	7.24
34	"	"	"		9.2	0.48	5.3	8.0	13.78
35	12/6/64	-	Escapule		1.96	0.32	0.44	5.9	6.66
36	"	-	Faick and Higgins		1.56	0.14	0.98	6.85	7.97
37	"	-	"		6.25	0.13	3.46	7.05	10.64
Arithmetic average of above assays from Moonlight No. 1 workings				0.02	9.43	1.10	3.88	9.28	

The ore minerals occur as disseminations and as small masses in the lime silicates and as small replacement bodies in the limestone above the silicate zone. The ore bodies seem to be somewhat tabular, more-or-less parallel to the bedding planes of the limestone. Escapule has observed that the ore seems to occur in elongate, pod-like ore bodies which pitch at a low angle toward the south. He has observed that the ore bodies have increased in size as he drove the adit from north to south. Likewise the size of the ore bodies apparently increases with increasing depth of the winzes. These observations seem to be perfectly valid for the mine as presently developed, however, geological reasons for the apparent increase in the size of the ore bodies are as yet unknown.

The metal content of the ore in the Moonlight workings is indicated by assays of 37 samples represented by 161 separate determinations for which Escapule has most of the assay certificates. These assays span the years from 1946 thru 1964. The assays are shown in table 2 and the descriptions that are available are given in table 3. The arithmetic average metal content of the samples shown in table 2 is as follows:

9.43 oz. silver/ton	9.28 percent zinc
0.02 oz. gold/ton	3.88 " lead
	1.10 " copper

In addition to the main adit and winzes there is a shallow inclined shaft about 180 feet southeast of the portal of the adit. The arithmetic average of 13 samples collected from various places in the inclined shaft showed a metal content as follows:

8.45 oz. silver per ton	9.41 percent zinc
0.01 oz. gold per ton	2.67 percent lead
	1.57 percent copper

Undoubtedly the above assays show the effect of a certain amount of sample selectivity and the indicated average probably is higher than mine run ore. From long experience with the ore Escapule estimates that it contains about as follows:

3.0 oz. silver per ton	8.0 percent zinc
0.01 oz. gold per ton	3.0 percent lead
	0.8 percent copper

In this estimate the silver content appears to be too low as indicated by a large number of assays. Assays representing about 50 samples of ore from the Moonlight workings have a ratio of about 1 ounce of silver to about 1 percent zinc and 1 ounce of silver to each 0.35 percent lead. The silver content of the ore from the Moonlight workings is higher than is usually found in this type of ore.

Silver Mine Area

Located about one mile southwest of the Moonlight mine and extending north about 3,500 feet from the Silver Cloud mine (see fig. 2 and 3) is an area where considerable silver has been

found in mine workings, prospect pits and rock outcrops. This area was originally claimed about the time of World War I by the late Jonathan Gordon, Mining Engineer, and Ernest Escapule, brother of the present owner. The claims were originally located as the Silver group, but were relocated as the Arizona group. After many years, in the late 1930's the claims were allowed to lapse and they reverted to the Public Domain. Then in 1942 Joe Escapule staked the Garnet group of claims over practically the same ground as was formerly controlled by his brother Ernest and Jonathan Gordon. The claims are unpatented, therefore, Escapule retains them by doing annual assessment work.

Each time the claims were relocated the location and orientation was changed slightly and new names were assigned. An attempt to show the relationship of the claims in the different groups is illustrated by figure 3, which was compiled from 3 sketch maps furnished by Escapule. A map dated April 23, 1932, when the claims were known as the Arizona group was drawn by Jonathan Gordon, and is believed to be an accurate representation of the claims as they existed at that time. Another sketch map showing the claims as the Silver group was probably also drawn by Gordon but this is only a rough sketch of doubtful accuracy. These two maps show that the claims join the patented Silver Cloud claim and are aligned with it, at least in part. The most recent map shows the claims aligned with and partly coinciding with section lines. Identifications of these claims by location is important because of the large number of samples, sample descriptions and assays that can be identified by individual claims in the group.

The Silver mine area is underlain by a light gray to white limestone thought to be Escabrosa. It ranges from massive to poorly bedded and dips westerly at moderate to low angles. It is slightly deformed and locally it is recrystalized. The limestone host rock has a normal grayish appearance, only slightly stained if at all, and a person would not suspect it to contain silver if it were not for the numerous mine workings and a very impressive record of assays dating as far back as January 1920.

In the silver area the high grade ore consists of short, thin, irregular veinlets and small pods or lenses of iron oxides and quartz on bedding planes and fractures in limestone. These appear to be more abundant in the mine workings than on the surface thereby suggesting that some of them may have been destroyed where exposed to weathering. In some places minerals thought to be silver chloride occur without recognizable associated minerals or in slightly silicified limestone. A specimen of the ore in Escapule's possession is sprinkled with native gold, cerusite (?) and a mineral that appears to be silver chloride. In the Silver Cloud mine, according to reports, some rich silver ore was found in white crystalline limestone or marble.

The writer has not had an opportunity to study the geology of this interesting area in detail but it may be quite large as indicated by a large number of samples collected and/or assayed by Gordon who was associated with the property for a period of

20 or 30 years. About 235 samples represented by about 541 individual assays can be accounted for on old records compiled principally by Gordon. Presumably most of these represent choice, select material sampled for specific purposes of finding ore bodies that could be mined at the time of sampling, but the samples indicate that a relatively large area is mineralized and that impressive amounts of silver with some gold occurs in several different types of host rock.

A study of the descriptions of the Gordon samples reveals that a variety of materials are mineralized. Significant gold and silver values are reported in quartz veins, siliceous zones, layers of limestone, brecciated and recemented limestone; white, pink and bluish limestone; red and brown iron oxides, galena, sphalerite lead and zinc carbonates. Apparently ore bearing materials penetrated the host rocks on an extensive scale and left small rich concentrations of silver with minor amounts of gold, lead and zinc scattered throughout a large zone.

On a list of samples and assays compiled by Gordon in 1932, which includes assays as old as January 1920, about 138 samples were grouped according to the claims from which they were collected. This list provides information concerning the amount and distribution of metals as known in 1932 but more recent information has not been correlated with the Gordon record. Distribution of the assays suggest that there is an anomalous high silver content in the limestones in an irregular area about 3,500 feet long and about 2,000 feet wide as sketched on the claim map, figure 3. The sample distribution by claims and the average amount of gold and silver in the assays reported by Gordon is shown in table 4, and figure 3 shows the locations as closely as can be determined.

Table 4. Average assays on the Arizona claims.

Claim	No. of samples represented	Average oz. gold per ton	Average oz. silver per ton	Ratio Oz. gold: Oz. silver
Arizona 1	26	0.25	10.63	1:42
" 3	30	0.14	17.01	1:121
" 4	5	0.03	25.30	1:843
" 5	9	0.08	25.80	1:360
" 6	12	0.20	16.98	1:85
" 7	19	0.26	7.7	1:30
" 8	16	0.07	19.20	1:274
" 13	23	0.11	37.80	1.344

The available assay records show that the ore locally contains erratically high values; one assay showed 3.33 ounces of gold and 405 ounces of silver per ton. In averaging Gordon's assays all those over 0.7 ounces per ton in gold and 70 ounces of silver were discarded. This procedure is of doubtful merit as indicated by five samples on the Arizona 4 claim which averaged 0.45 ounces of gold but only averaged 0.03 ounces after discarding the erratic high assays. Discarding exceptionally high assays for both gold and silver also gave questionable results for the average assays reported for Arizona 6 and 3 claims. The ratio of gold to silver as shown in the preceeding table is too erratic to be significant, however, it does emphasize the high proportion of silver.

The assay records compiled by Gordon show that there is considerable lead on Arizona 8 claim and both lead and zinc on Arizona 13. The assay records show that these metals occur as both carbonates and sulfides and both contain silver.

The best samples available are obtained from two small smelter shipments made by Escapule, the results of which are as follows:

	Shipment 1	Shipment 2
Date	Oct. 11, 1950	Aug. 26, 1954
Dry weight	4.8 tons	27.2 tons
Destination	Hawley & Hawley Douglas	ASARCO El Paso
Source of ore	Garnet No. 1	Garnet No. 1
Gold Oz/T	0.88	0.32
Silver Oz/T	66.4	28.0
Copper %	0.61	0.15
Lead %	15.6	4.4
Zinc %	--	2.5

Another shipment made on Feb. 18, 1955 by Escapule consisted of 174 sacks of select high-grade ore amounting to 8.08 dry tons which was shipped to the ASARCO smelter at El Paso. Smelter returns are not available for this shipment but the ore had an estimated value of $525 per ton and Escapule received about $3,700 for the shipment. Several other small shipments have been made for which there is no record.

In 1950 Gordon made a cyanide test for the recovery of gold and silver from some selected rich ore and obtained about 97 percent recovery of the silver and about 88 percent recovery of the gold. The arithmetic average of 3 assays of this ore, including screened and oversize, contained 1.85 ounces of gold and 282.54 ounces of silver per ton, and 6.05 percent lead and 0.24 percent copper. The sample was provided by Escapule but the source of the ore is not known to the writer.

Zinc Ore Zone

Located about one-half of a mile north of the Silver area discussed above which ajoins the Silver Cloud mine, is the Garnet 8 claim which covers the main outcrop of an ore zone containing principally zinc associated with lead and silver. This is near (and possibly beyond) the north end of the zone in which an anomalous high silver content has been indicated by assays on over 235 samples. The host rock for the zinc zone is believed to be Escabrosa limestone like that in the southern part of the Silver area. The limestone is cut by two dark gray to greenish dikes and the ore appears to be related to the dikes. The trend of the ore-dike zone is about N. 75 degrees E., and it dips steeply north.

The limestone near the dikes has been metamorphosed to a tough fine-grained mass of silicate minerals, quartz and calcite. The most important mineral is a light brown to brownish yellow sphalerite which might be referred to as "resin Jack". It occurs

as disseminated grains and small to large masses in the silicate zone and in limestone near the dikes. Galena occurs in small disseminated grains closely associated with the sphalerite. The ore zone appears to be at least several feet wide and Escapule reports that he has found ore across widths as great as 50 feet including the dikes. It is conceivable that this ore zone might in some way be related to the ore zone exposed in the Moonlight workings but this is only a guess. These two ore zones are similar in some important aspects, i.e.; both deposits contain lead, zinc and silver associated with a silicate gangue in metamorphosed limestone. Also the ratios of silver to both zinc and lead are similar. The principal difference is that copper occurs at the Moonlight but not on the Garnet 8 claim.

The zinc ore zone is now covered by the Garnet 8 claim which overlaps the older Arizona claims 4 thru 7, and the ore zone apparently extends eastward to the still older Silver Thread and Silver Link claims. The western part of the zone may lie on the Garnet 13 claim.

Assay records indicate that the ore zone contains considerable silver as well as lead and zinc. Secondary cadmium sulfide (greenockite) is present as films on fractures in the ore and indicates that the cadmium may be sufficiently abundant in the sphalerite to become a commercial by-product of the zinc ore. The Gordon assay records provide numerous assays of gold and silver which are believed to represent the zinc ore zone. These assays are shown in table 5.

Table 5. Old assays of the zinc ore zone.

Name of claim	Number of samples	Average ounces gold per ton	Average ounces silver per ton
Arizona 4 (Silver Link)	5	0.03*	15.30
Arizona 5	9	0.07	25.8
Arizona 6 (Silver Thread)	12	0.16	13.4*
Arizona 7	19	0.21*	7.3*

The * indicates that excessively high assays have been eliminated before obtaining the average.

The assays summarized in the preceeding table seem to be verified by more recent samples that are more accurately identified as having originated on the Garnet 8 claim. These are shown in table 6.

Table 6. Recent assays of the zinc ore zone

Date	Sampled by	Oz. Gold per ton	Oz. Silver Per ton	Percent lead	Percent zinc
1/12/49	J.M.Escapule	Tr.	6.60	0.35	0.50
5/20/50	"	-	44.3	9.00	13.20
1/18/51	"	0.26	18.74	-	-
7/1/57	#1 W.B.Gordon	-	1.1	0.8	-
7/1/57	#2 "	-	19.4	5.1	-
7/1/57	#3 "	-	1.7	0.9	24.8
		Average	15.3	3.0	12.8

A short field examination and the assay records reported in tables 5 and 6 indicate that the ore zone on the Garnet 8 claim contains considerable zinc, lead, silver and a little cadmium. The zinc is nearly iron free "resin jack" and when milled should yield a concentrate containing more than 50 percent zinc. The silver to zinc ratio is about 1 ounce silver to 1 percent zinc and the silver to lead ratio is about 1 ounce silver to 0.2 percent lead. These ratios have about the same order of magnitude as the metal ratios at the Moonlight workings.

ORE RESERVES AND FUTURE ORE DISCOVERIES.

Exposed in the adit and winzes of the Moonlight mine is a small reserve of proven and probable ore; probably on the order of 5,000 tons. This is based on a depth of about 70 feet below the adit, a width of about 20 feet at the bottom of winze 4, and an assumed strike length of about 30 feet. Also, there is ore exposed in the other winzes, in a number of places in the adit and in the surface workings above the adit, therefore, there is considerable material that should be classified as possible ore. The writer estimates the grade of this ore to be about as follows:

8.0 oz. silver per ton	8.0 percent zinc
0.01 oz. gold per ton	3.0 percent lead
	0.8 percent copper

There are a few hundred tons of zinc-lead-silver ore indicated on the Garnet 8 claim and the possibilities of finding additional ore are excellent. The Silver mine area is thought to contain considerable silver ore suitable for open pit mining but it is not practical to estimate the reserves from the information now available.

Far more important than the small amount of ore showing in the present mine workings is the possibility of finding ore to the south and west, and also a few hundred feet north of the Moonlight workings. As pointed out in the structural section of this report the entire limestone block in the hanging wall of the Dragoon fault has been structurally deformed so that it is favorable for ore deposition. The writer is optimistic about finding considerable ore in this block of limestone because of the good silver-lead-zinc ore exposed on the Moonlight and Garnet 8 claims, the large silver-bearing area near the old Silver Cloud mine and the copper-iron ore at the Black Diamond mine. The limestone in the hanging wall of the Dragoon fault probably is favorable for the occurrence of ore for a long distance, possibly a couple of miles, south of the Moonlight Mine and for a considerable distance west of the outcrop of the fault. This is a geologically favorable area which warrants considerable exploration for ores of silver, copper, lead znd zinc, and the writer believes important ore discoveries will be made in this zone.

The footwall of the Dragoon fault may also contain replacement type ore bodies because it is chiefly limestone conglomerate for

long distance according to Gilluly (1956, p. 143), and this would be favorable for mineralization.

If exploration is successful in finding additional ore bodies like those at the Moonlight mine they probably would have to be mined by underground methods, but silver ore like that on the Garnet group of claims may be suitable for medium to large scale open pit mining.

SUGGESTED EXPLORATION

The Escapule property, consisting of the Moonlight, Northside and Garnet groups of claims, has been thoroughly prospected during the last 50 years, especially since World War II. This work has demonstrated conclusively that the property is well mineralized and it justifies a well planned and carefully executed exploration program. This should consist of detailed geological mapping followed by geochemical and geophysical surveys and by exploration drilling. Such exploration work should be conducted on the limestones in the hanging wall of the important Dragoon fault and the exploration effort should extend at least a couple of miles south of the Moonlight mine and westward to the foot of the Dragoon Mountains.

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Wilson, E. D., Central Dragoon Mountains area, in Arizona Zinc and Lead Deposits, Arizona Bur of Mines Bull No. 158, p. 20-28, 1951. (This report describes the Abril and San Juan mines and mentions the Escapule mine).

10-8-69

TO Dr. John N. Faick
Mine Exploration Company, Inc.
3130 E. Grant Road
Tucson, Arizona 85716

HEINRICHS GEOEXPLORATION COMPANY
808 W. GRANT ROAD - P. O. BOX 5671
TUCSON, ARIZONA 85703
Area Code 602 Phone 623-0578
Geophysical Exploration Research Engineering

SUBJECT: Preliminary Report - Cochise County, Arizona DATE: 11/3/69

2ND FOLD

Dear John:

Thank you for allowing us to study the enclosed report.

The situation is under consideration and we will advise if, as and when favorable to proceed further. Let us know when this is no longer available.

Sincerely yours,

HEINRICHS GEOEXPLORATION COMPANY

Walter E. Heinrichs, Jr.
President

WEHjr/md

Enclosure - Report

1ST FOLD

PLEASE REPLY TO ⟶ SIGNED

DATE SIGNED

SEND WHITE AND PINK COPIES WITH CARBON INTACT. PINK COPY IS RETURNED WITH REPLY.

DETACH THIS COPY–RETAIN FOR ANSWER

Faick

10/3/69

Grose

Don Corley

Walt recommends copying report & return original to Faick saying "situation under consideration & will advise if favorable.

Meanwhile we consider: Shaw? yes*

Juhon.? No*

Other? who*?

None for now..

*

W.

New folder.

MINE EXPLORATION CO., INC.

3130 E. GRANT RD., TUCSON, ARIZONA 85716

JOHN N. FAICK, Ph.D.
~~Mining Geologist~~
Arizona Register No. 6352

TELEPHONE (602) 325-7123
(602) 325-2312

August 27, 1969

Mr. Walter Heinrichs
Heinrichs Geoexploration Co.
P. O. Box 5671
Tucson, Arizona 85703

BOX 5671 TUCSON, ARIZONA 85703
Phone (AREA 602) 623-0578

Dear Walt:

We believe the property briefly described on the attached information sheet will be of interest to your company.

For a complete geological report and/or inspection trip to the property contact our office.

Check Quad & get Comments: Grover

Don. Let's look @ it (the report that is)
D.B.C.

Sincerely yours,

John N. Faick

John N. Faick

Jean or Phillis: Please phone Faick for copy of the mentioned report to review at our convenience & return to him. Depending on length we can assign someone, (or Jean scrape up a half-hour or so, or almost any given consecutive day or two as necessary. Then we will let him know of our possible interest.

KJ.

PROPERTY SUMMARY

Contact:- John N. Faick (602) 325-7123
Mine Exploration Co., Inc. (602) 325-2312
3130 East Grant Road
Tucson, Arizona 85716
or Walter Lautz (602) 327-7524

Brief Description:- A group of 17 unpatented mining claims owned by Joe M. Escapule, of Tombstone, Arizona, is situated about 12 miles northeast of this famous old silver mining community. The claims cover three mineralized zones, two of which have been developed by a few hundred feet of mine workings. About 5,000 tons of good quality zinc-lead-silver ore has been developed by the underground workings known as the Moonlight mine, and about one mile west-southwest of it nearly similar ore is exposed in small prospects on the Garnet 8 claim. Extending south of this claim for a distance of about one-half of a mile, and adjoining the old silver Cloud mine is an extensive zone in which assays on 235 samples indicate rich silver ore in small lenses, pods and veinlets widely distributed throughout an extensive block of limestone.

The zinc-lead-silver deposits on Joe Escapule's claims are sufficiently large and rich to justify further exploration with reasonable expectations of finding considerable ore suitable for underground mining. The silver-bearing area may contain enough silver throughout a sufficiently large zone to be mined by modern open pit methods. It should be explored with this as an objective.

Available:- We are prepared to show the claims to interested parties at any convenient time.

THE ESCAPULE MINE, DRAGOON MOUNTAINS MINING DISTRICT
COCHISE COUNTY, ARIZONA

A Preliminary Report

by

John N. Faick, Ph.D.
Registered Geologist

Prepared for

Mine Exploration Company, Inc.
3130 East Grant Road
Tucson, Arizona 85716

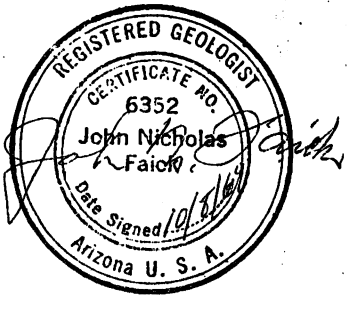


TABLE OF CONTENTS

ILLUSTRATIONS

TABLES

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

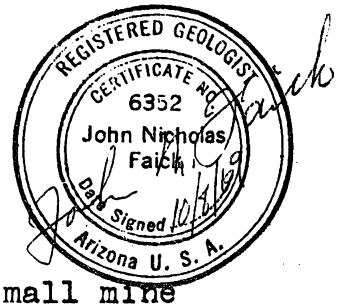
The Escapule mining property, consisting of 17 unpatented mining claims, is situated about 12 miles northeast of Tombstone, Arizona. The claims cover three mineralized zones, two of which have been developed by a few hundred feet of mine workings. About 5,000 tons of good quality zinc-lead-silver ore has been developed by the underground workings known as the Moonlight mine, and about one mile west-southwest of it nearly similar ore is exposed in small prospects on the Garner 8 claim. Extending south of this claim for a distance of about one-half of a mile, and adjoining the old Silver Cloud mine is an extensive zone in which assays on 235 samples indicate rich silver ore in small lenses, pods and veinlets widely distributed throughout an extensive block of limestone.

The zinc-lead-silver deposits on Escapule's claims are sufficiently large and rich to justify further exploration with reasonable expectations of finding considerable ore suitable for underground mining. The silver-bearing area may contain enough silver throughout a sufficiently large zone to be mined by modern open pit methods. It should be explored with this as an objective.

All of the ore on the Escapule property occurs in folded and faulted Paleozoic limestone in the hanging wall side of the prominent Dragoon fault. A large block of this limestone extending south and west of the Moonlight mine is geologically favorable for the occurrence of additional ore bodies like those presently known. The writer recommends that this block of limestone be thoroughly explored with modern methods, beginning at or near any one of the three potentially productive ore zones already known.

THE ESCAPULE MINE, DRAGOON MOUNTAINS MINING DISTRICT, COCHISE COUNTY, ARIZONA

A Preliminary Report
by
John N. Faick, Ph.D.
Registered Geologist



INTRODUCTION

Mr. Joe M. Escapule of Tombstone, Arizona owns a small mine situated in the Dragoon Mountains Mining District about 12 airline miles northeast of the famous old silver mining community of Tombstone. This mine, which is located on 17 contiguous unpatented claims is locally well known for its good quality sulfide ore containing lead, zinc, copper and silver. The mine has been developed largely since World War II by about 400 feet of underground workings and by several shallow cuts on the surface. These workings are located high on the northwest slope of Black Diamond Mountain, principally on an unpatented claim known as the Moonlight No. 2, and the adjacent Moonlight No. 3 claim. In the report which follows this will be referred to as the Moonlight Mine.

About one-fourth of a mile north of the Moonlight Mine are some old mine workings from which several railroad cars of high-grade copper ore reportedly were shipped many years ago. We have no record of this work and the area will not be discussed in this report.

About one mile southwest of the Moonlight workings, on another part of Escapule's group of claims, is an area in which some rich silver ore was developed on a small scale, and a few small shipments of high-grade ore were made many years ago. Escapule controls this area with the Garnet group of unpatented claims, but during the 1920's and 1930's the claims were known as the Silver group and as the Arizona group. A large amount of sample and assay data is available which can be correlated by use of the earlier claim names, therefore, these will be retained for use in this report, but the area will also be referred to as the Garnet claims and as the Silver mine area. This area adjoins the north side of the Silver Cloud patented claim from which some silver ore has been produced. On the Garnet 8 claim, about one-half mile north of the Silver Cloud claim is another intensely mineralized zone in which some high-grade zinc ore containing good values in silver is exposed in two short tunnels and several shallow prospect pits. Thus, there are four well mineralized zones on the Escapule claims of which three will be considered in this report.

The writer has visited the Moonlight mine a number of times over a period of about 15 years and examined the Silver mine area and the zinc ore zone on the Garnet 8 claim for the first time on September 30, 1969

LOCATION, ACCESSIBILITY AND TOPOGRAPHY

The Escapule mine, or Moonlight mine, is shown on the U. S. Geological Survey topographic map of the Pearce quadrangle and

on figures 1 and 2 of this report. It is located near Middle Pass in the Dragoon Mountains. The mine is reached from Tombstone by driving north two miles on Highway 80, thence following the Pearce road to a right turn-off in the vicinity of Middle Pass. From the turn-off it is about one mile south to the mine and a loaded pickup truck or 4-wheel drive vehicle should be used over this last mile. To reach the Silver area on the Garnet group of claims it is necessary to turn off the Pearce road where crossed by a power line and follow it south a short distance to a jeep road which ascends a gentle slope to the mines which are located low on the west slope of the Dragoon Mountains. From the Silver area the outcrops of rich zinc ore on the Garnet 8 claim can be reached by driving northward a short distance over a rough jeep trail that follows along the fence line on the west side of Section 25, thence driving northeast up a dry arroyo.

The Escapule mine (Moonlight workings) is located near the east side line of Sec. 24, T. 18 S., R. 23 E., Gila and Salt River Base Meridian, and the claims extend southwestward into Section 25 and southeastward in to an unsurveyed area equivalent to Sec. 19, T. 18 S., R. 24 E. The mine is at an altitude of about 6,500 feet on the steep northern slopes of Black Diamond Peak and is about three-fourths of a mile northwest of the Black Diamond Copper-iron mine. The Garnet claims or Silver mine area is on the west slope of the Dragoon Mountains at an altitude of about 5,800 feet or about 700 feet lower than the Moonlight workings.

POWER, WATER AND TRANSPORTATION

Natural gas and electric power are available in Tombstone and a 115 KV transmission line passes about midway between Tombstone and the mine. (See figure 1) Water is relatively scarce at the mine and the nearest industrial supply is at the San Pedro River a few miles west of Tombstone. The area is served by good roads and rail facilities are available on the Southern Pacific Railroad which follows along the San Pedro River and joins the main line at Benson.

HISTORY AND OWNERSHIP OF THE PROPERTY

The Escapule group of claims consist of 17 contiguous claims known as the Moonlight 1, 2 and 3; Northside 1, 2 and 3; Garnet 1 and 2; Garnet 4 thru Garnet 12. Garnet 3 was not recorded. Joe M. Escapule and his wife Marghriet, Tombstone, Arizona, are the sole owners of the claims.

Ore was discovered near the site of the Moonlight mine workings by Joe Escapule about 1925. He and his brother Ernest then located claims on the discovery but these claims were allowed to lapse. Then about 1935 Joe Escapule relocated the claims and has maintained them by doing the required annual assessment work and developing his mine since that date. The presently active workings of the Escapule mine are located principally on the Moonlight No. 2 claim and to some extent on Moonlight No. 3.

The Garnet group of claims, first known as the Silver group and later as the Arizona group, are much older than the Moonlight claims. The Silver group was first located about the time of World

War I by the late Jonathan Gordon, Mining Engineer, and Ernest Escapule, and then they were relocated as the Arizona group by which name they were known in 1932. The claims were allowed to lapse during the late 1930's and in 1942 Joe Escapule located the Garnet group of claims over the same area. All of these unpatented claims have been maintained by annual assessment work and development work. The relative position of the claims in the Silver, Arizona and Garnet groups is shown on figure 3.

PRODUCTION

Several small shipments of selectively mined ore have been produced from the Silver area but records of only three of these are available. One of these shipments amounted to 8 tons of high-grade silver ore which yielded a net smelter return of about $3,700. The two other shipments amounted to 4.8 and 27.2 tons of ore containing 0.88 and 0.32 ounces of gold; and 66.4 and 28.0 ounces of silver respectively. These shipments and a large number of assays are reported in greater detail in the descriptions of the mine areas.

At the Moonlight mine some ore has been stockpiled on the dump but none has been sold and no ore has been produced from the zinc deposit on the Garnet 8 claim. It is reported that several railroad cars of copper ore were shipped many years ago from a small mine located about one-fourth of a mile north of the Moonlight mine but there is no record of this production.

In the Dragoon Mountains district, within 2 or 3 miles of the Escapule mine, considerable ore has been produced from several small mines. The Abril and San Juan (Jonathan Gordon) mines yielded significant tonnages of zinc ore and copper ore was produced from the nearby Middlemarch mine. The Black Diamond mine, which is located about three-fourths of a mile southeast of the Moonlight mine yielded high-grade copper ore from an impressive mineralized zone consisting mostly of magnetite and garnet. This copper ore was treated at a small smelter located about one mile east of the mine. The Silver Cloud mine reportedly yielded some selectively mined high-grade ore valued at a little more than $100,000.

The Cretaceous and older rocks are intruded by a number of igneous bodies of which the Stronghold granite is the largest and most widespread. It underlies an area of about 50 square miles in the northern part of the Dragoon Mountains, just north of the Middle Pass area under consideration in this report. Large dikes related to the Stronghold granite were mapped by Gilluly (1956) south of the Middle Pass area, especially in the vicinity of the Black Diamond mine and southeast of it. (See fig. 4). The Stronghold granite and the great dikes related to it are of Tertiary age according to Gilluly.

A small quartz monzonite intrusive, named the Cochise Peak quartz monzonite, extends northwestward from a point about one mile northwest of the Escapule mine. (See fig. 4). It was mapped by Gilluly (1956) and is regarded by him as belonging to a group of intrusives of Triassic-Jurassic age.

The close relationship of these igneous intrusives and the mineralized zones developed by the mines was observed by Wilson (1951, p. 12). He noted that the zinc-lead-silver ore at the nearby Abril and San Juan mine and mines in the Courtland-Gleeson district are relatively near such intrusive masses. No large bodies of igneous rocks are known within about one mile of the Escapule mine but the ore presumably is related either to the Cochise Peak quartz monzonite of Triassic-Jurassic age or to the major dikes associated with the Cochise Stronghold granite of Tertiary age. The zinc silver ore on the Garnet 8 claim is closely related to some dark greenish gray fine-grained dikes. The age of the ore and the igneous rock to which it is genetically related is at present unknown.

GENERAL GEOLOGY

Rocks

The geology of the Dragoon Mountains has been described in three published reports listed in the attached bibliography as follows: (1) Gilluly, Cooper and Williams (1954), (2) Gilluly (1956) and Wilson (1951). This published literature was freely used by the writer in preparation of the present report.

The generalized stratigraphic column and igneous history of the Dragoon Mountains is remarkably similar to that at Tombstone, Johnson Camp, Swisshelm and other productive mining districts in Cochise County. The oldest rock in the Middle Pass area is Precambrian schist with which is associated some granitic-type intrusive rocks. These schistose and granitic rocks form the basement rocks upon which extremely thick Paleozoic and Mesozoic sedimentary rocks have been deposited. (See fig. 4 and 5). Paleozoic formation represented in the Middle Pass area is the Bolsa quartzite of Middle Cambrian age, and which is about 300 feet thick. Deposited upon this in sequence are the Cambrian Abrigo limestone, Devonian Martin limestone, Mississippian Escabrosa limestone and several formations of the Naco group of Pennsylvanian and Permian age. Resting unconformably upon the Paleozoic formations is a thick series of sedimentary rocks consisting of shale, sandstone and conglomerate which represents the Bisbee group of Cretaceous age. The generalized sequence of rocks in the Middle Pass area, which was abstracted and modified from Gilluly (1956, p. 8) is shown on table 1.

Structure

The structural geology in the vicinity of the Escapule mine is exceedingly complex and the best possible interpretation of it was given in the notable report by Gilluly (1956) from which most of the following information was abstracted. The structural conditions are illustrated by the geologic map shown in figure 4 and Gilluly's geologic sections which are reproduced in figures 5-A, 5-B and 5-C. According to Gilluly most of the deformation is post Cretaceous in age and the most conspicuous structural feature is the Dragoon fault. This is a high-angle reverse fault which trends northwesterly and dips southwest about 60-70 degrees. Near its northern end in Section 14, about one mile west of Middle Pass the displacement on the fault is about 100 feet but it increases markedly toward the south. In the Escapule and Black Diamond Peak areas the fault clearly separates the Paleozoic limestones on the west or hanging wall side from the Cretaceous Bisbee formation in the footwall or eastern side of the fault.

Between the Escapule and Festerline mines (fig. 4) the Dragoon fault is offset by a steep easterly-trending fault, the only break in its continuity for several miles. South of this transverse fault the Horquilla limestone (Parmian) wedges out between the fault and a thrust plate of Escabrosa limestone, but the Horquilla makes its appearance again about one-fourth of a mile farther south. The formations referred to cannot be separated on small scale maps, therefore, they are lumped together as undifferentiated Paleozoic limestones as shown on figure 4.

There are numerous thrust faults that slice the Cretaceous and older rocks east and southeast of the Escapule mine. With the exception of the west dipping Dragoon fault the thrust faults strike northwesterly and dip easterly with the overthrust displacement from the southwest toward the northeast. These thrust faults caused a repetition of thin thrust slices and a thickening of the formations. Pronounced folding of the stratified rocks accompanied or preceeded the thrust faults, and the beds of the Bisbee formation in the footwall of the Dragoon fault have been overturned.

The summit of Black Diamond Peak is a fault outlier or thrust block of Escabrosa limestone, however, this is not shown on the small scale map, figure 4, but is suggested by Gilully's Section VIII, shown in figure 5-B. West of Dragoon Camp Gilluly reports that a still higher thrust fault forced Colina limestone over the Borquilla limestone and forms the hanging wall segment of the Dragoon fault.

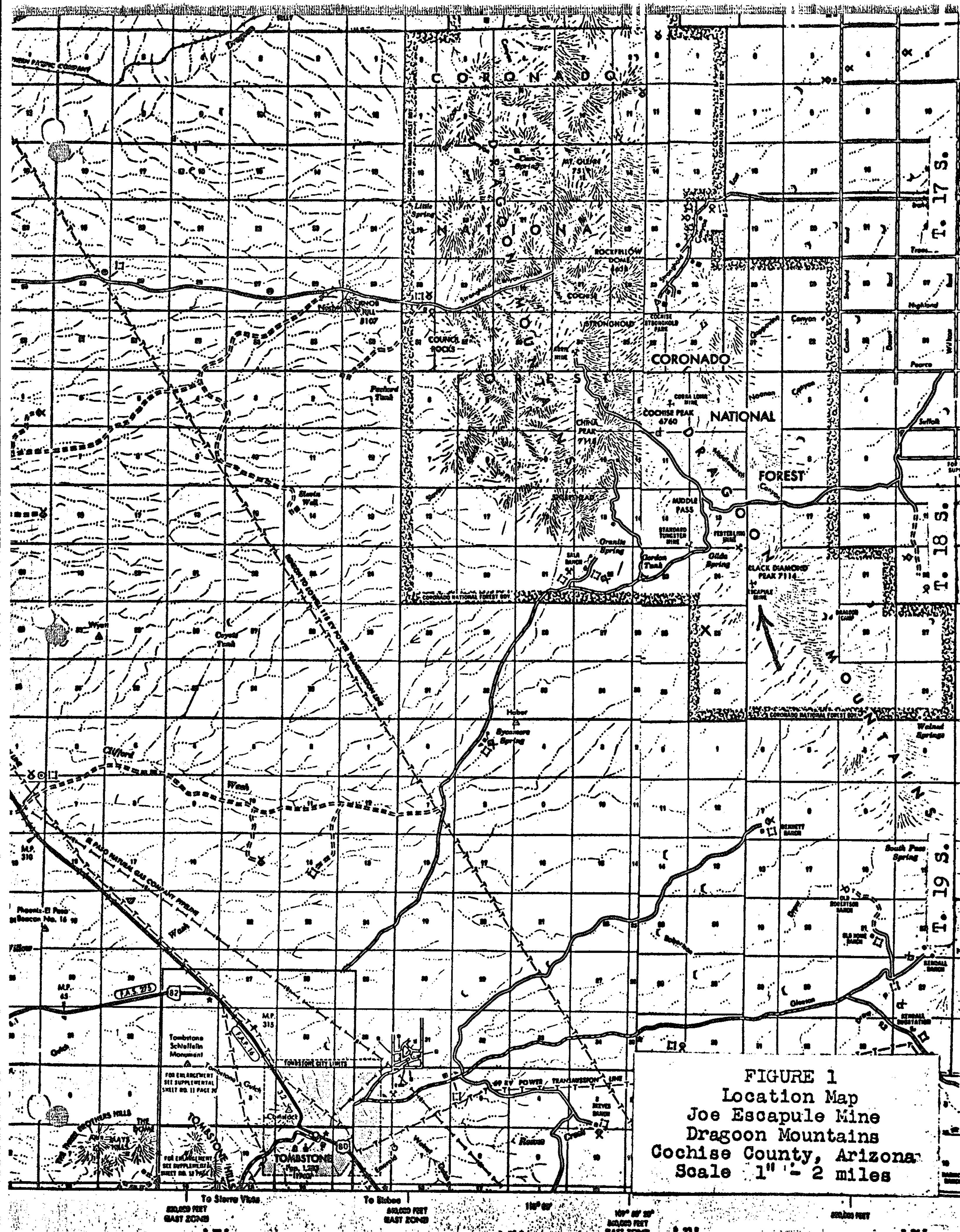


FIGURE 1
Location Map
Joe Escapule Mine
Dragoon Mountains
Cochise County, Arizona
Scale 1" = 2 miles

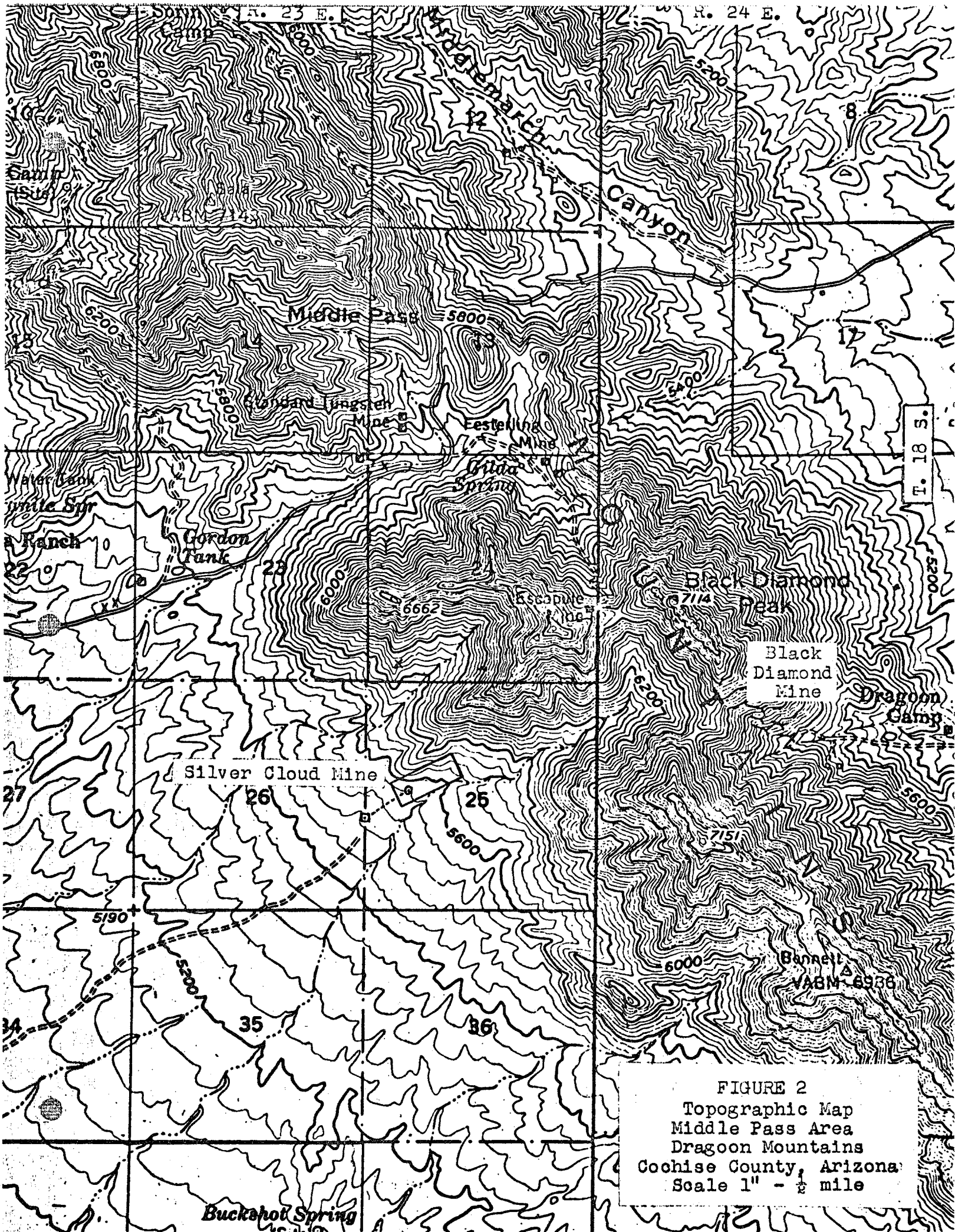


FIGURE 2
Topographic Map
Middle Pass Area
Dragoon Mountains
Cochise County, Arizona
Scale 1" - ½ mile

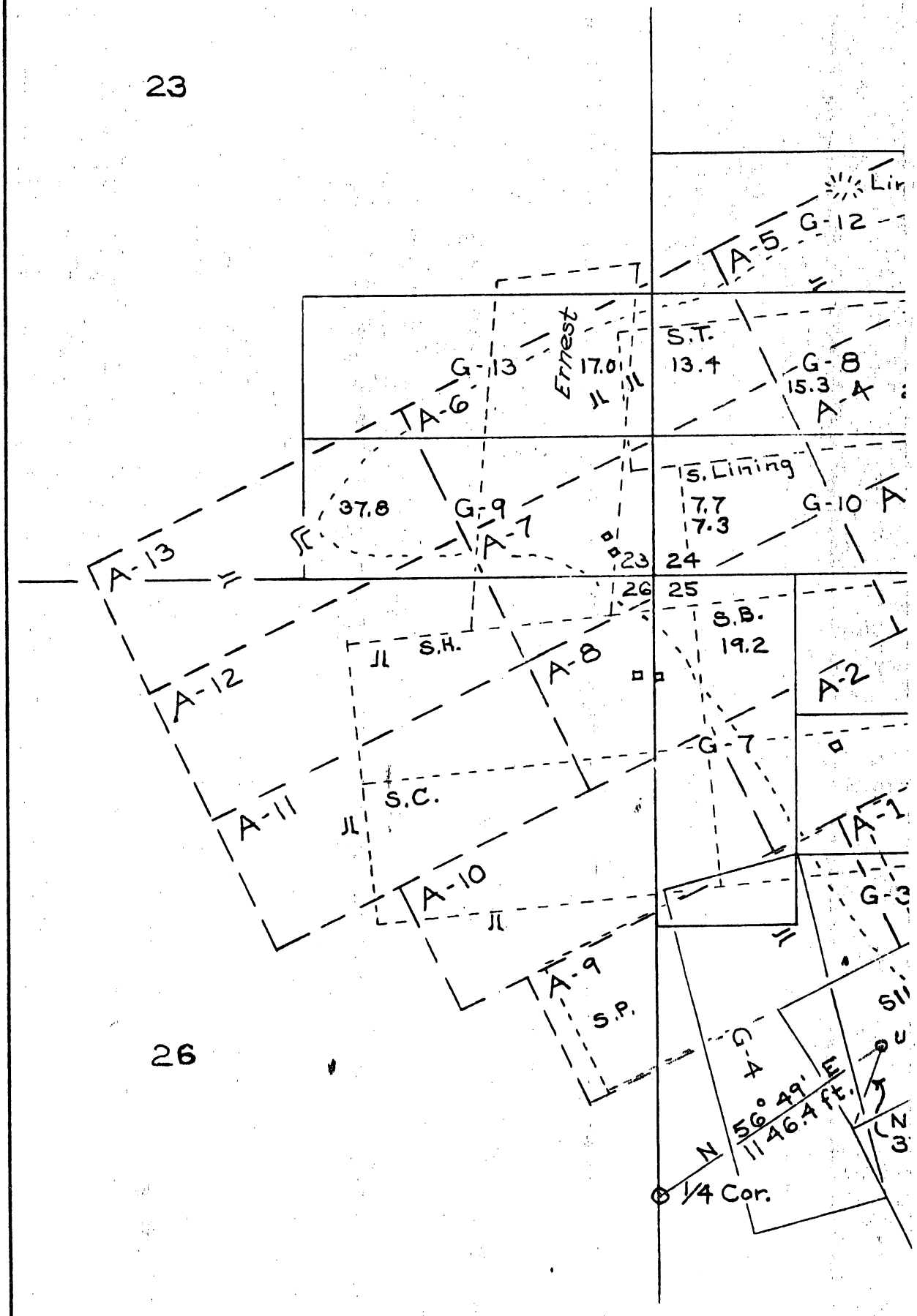


FIG. 3; COMPOSITE CLAIM MAP; SOUTH

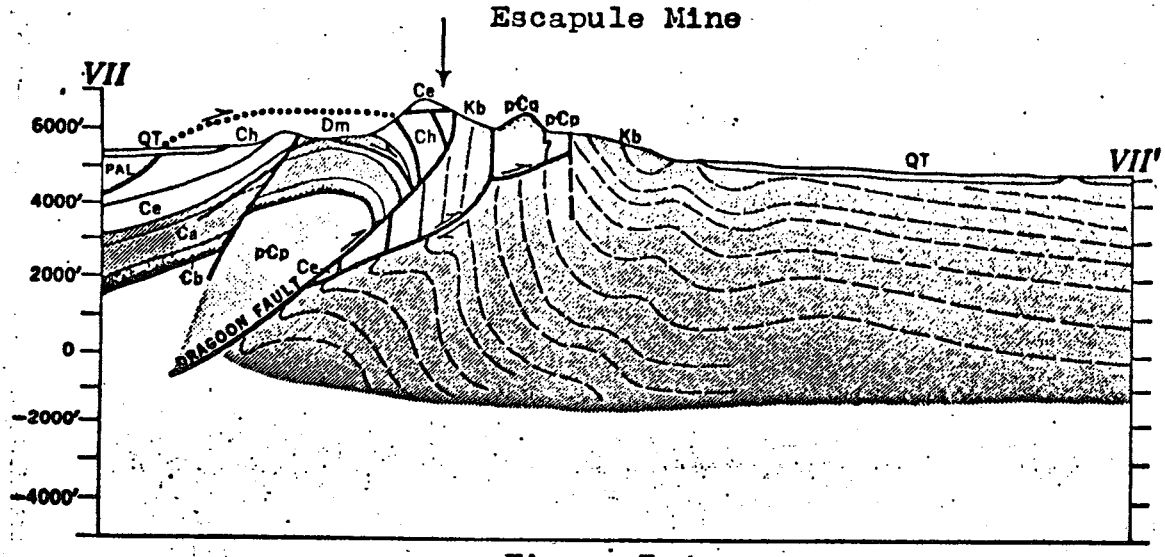


Figure 5-A

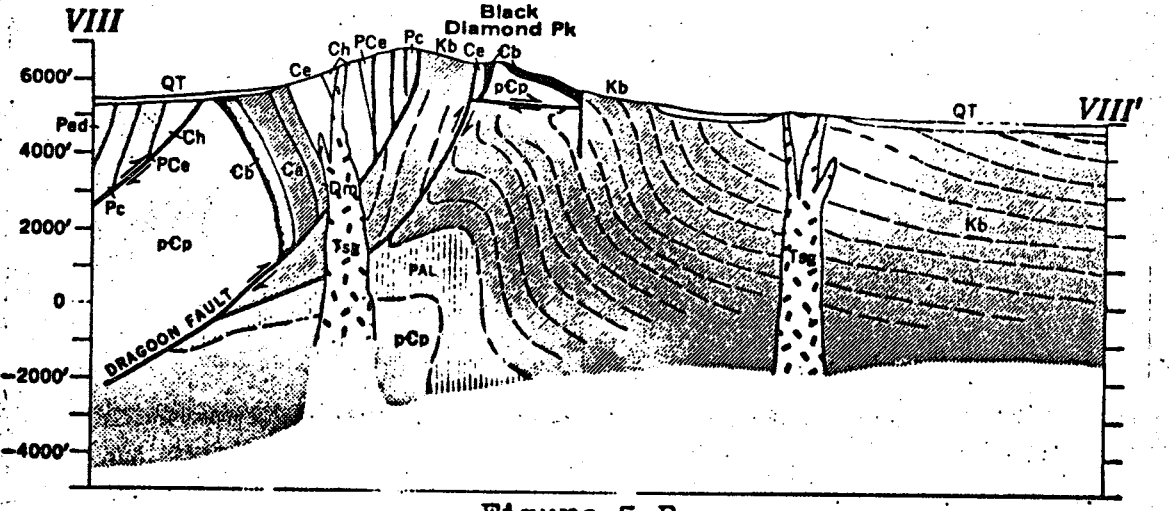


Figure 5-B

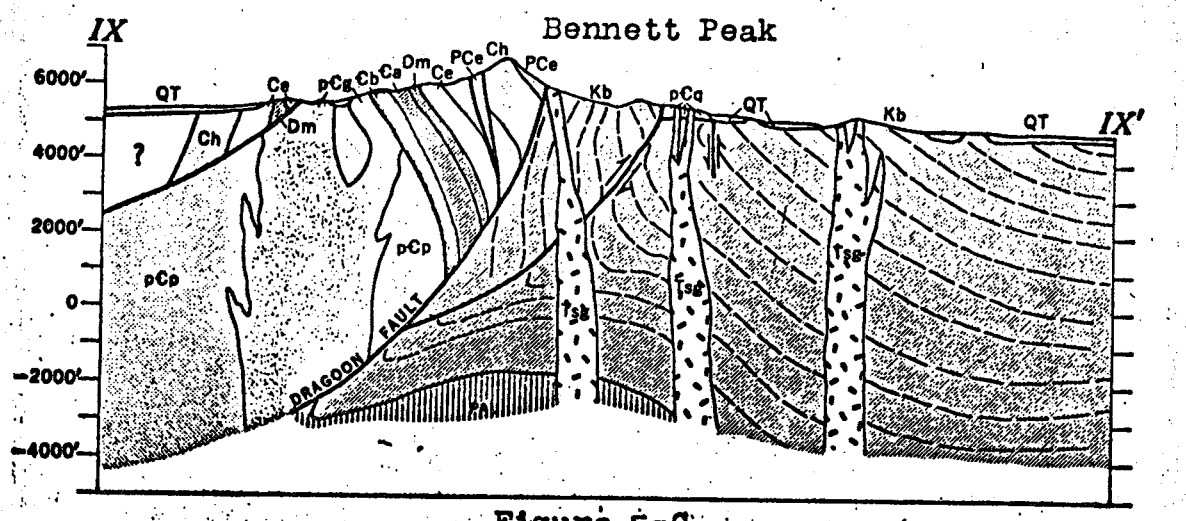


Figure 5-C

Figure 5. Gilluly's Geological Sections VII, VIII and IX

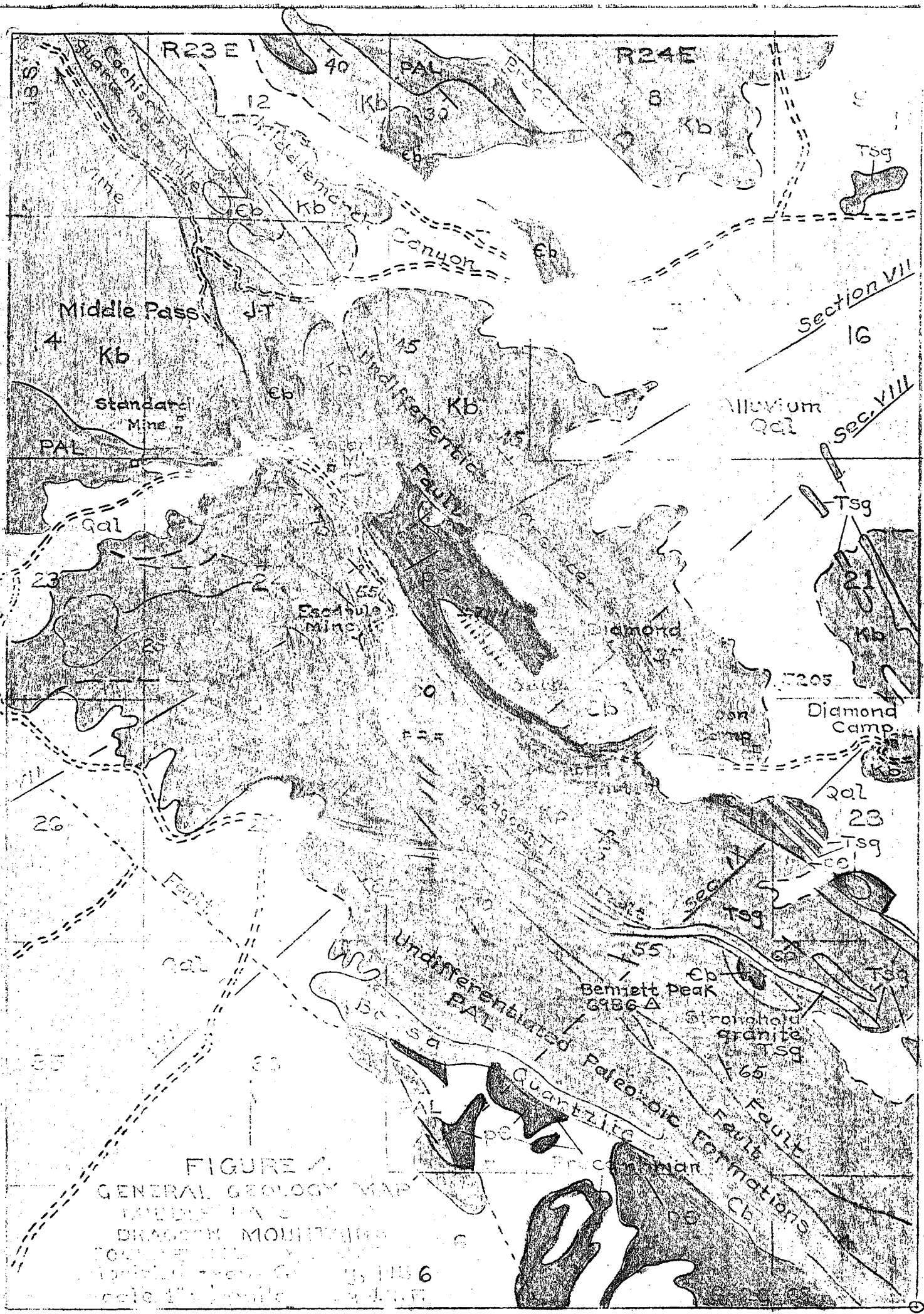
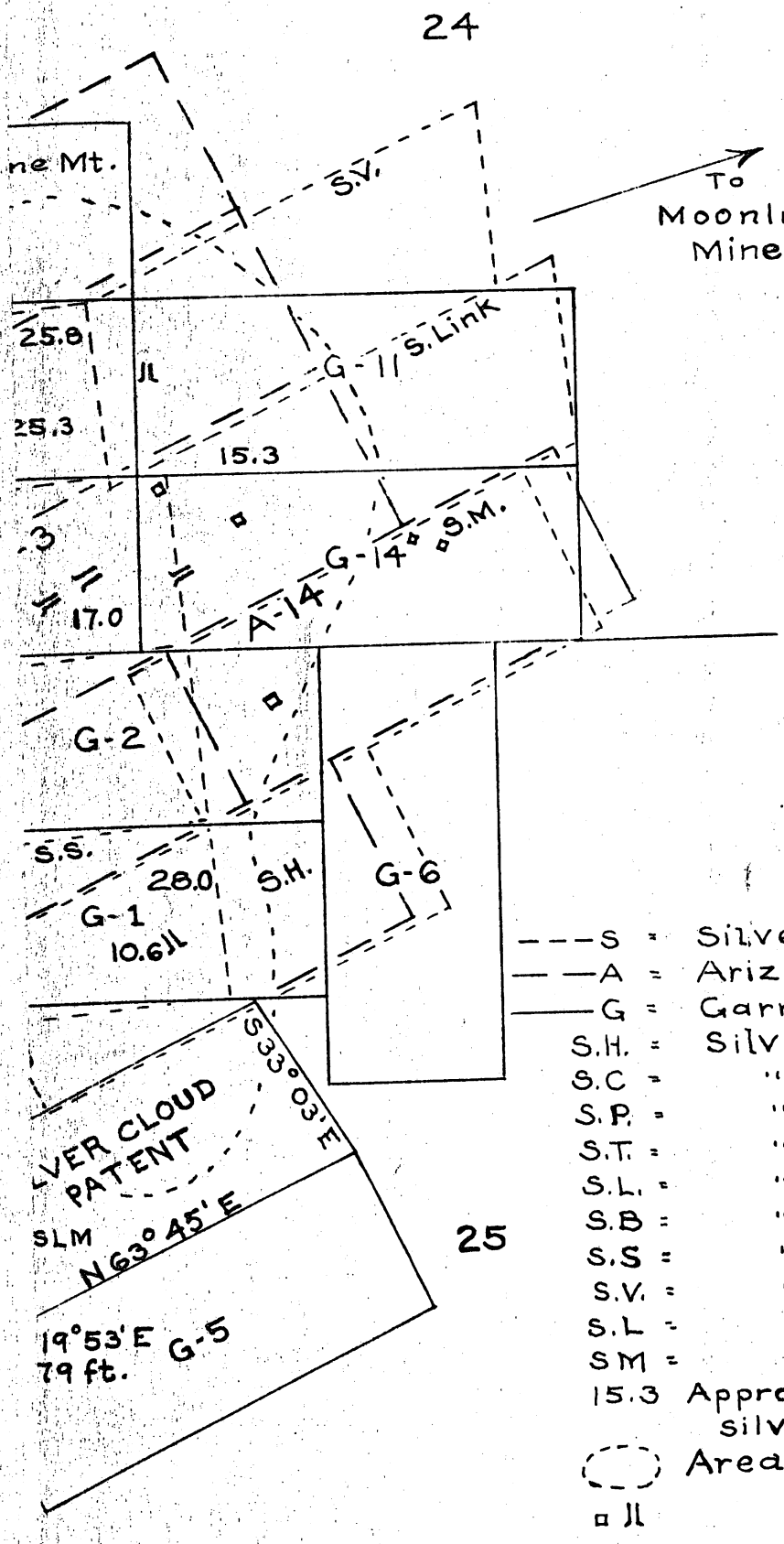


FIGURE 4
GENERAL GEOLOGY MAP
DRAGOON MOUNTAINS



LEGEND

---S	=	Silver Group	1920 - 1930
— —A	=	Arizona Group	1930 - 1940
——G	=	Garnet Group	1942 - 1969
S.H.	=	Silver Hill	
S.C	=	" Chain	
S.P.	=	" Point	
S.T.	=	" Thread	
S.L.	=	" Lining	
S.B	=	" Bearing	
S.S	=	" Sheen	
S.V.	=	" Vein	
S.L	=	" Link	
SM	=	" Moon	

15.3 Approximate location average silver assays by claim.

Area of silver anomaly

▫ ll

WESTERN PART OF ESCAPULE PROPERTY

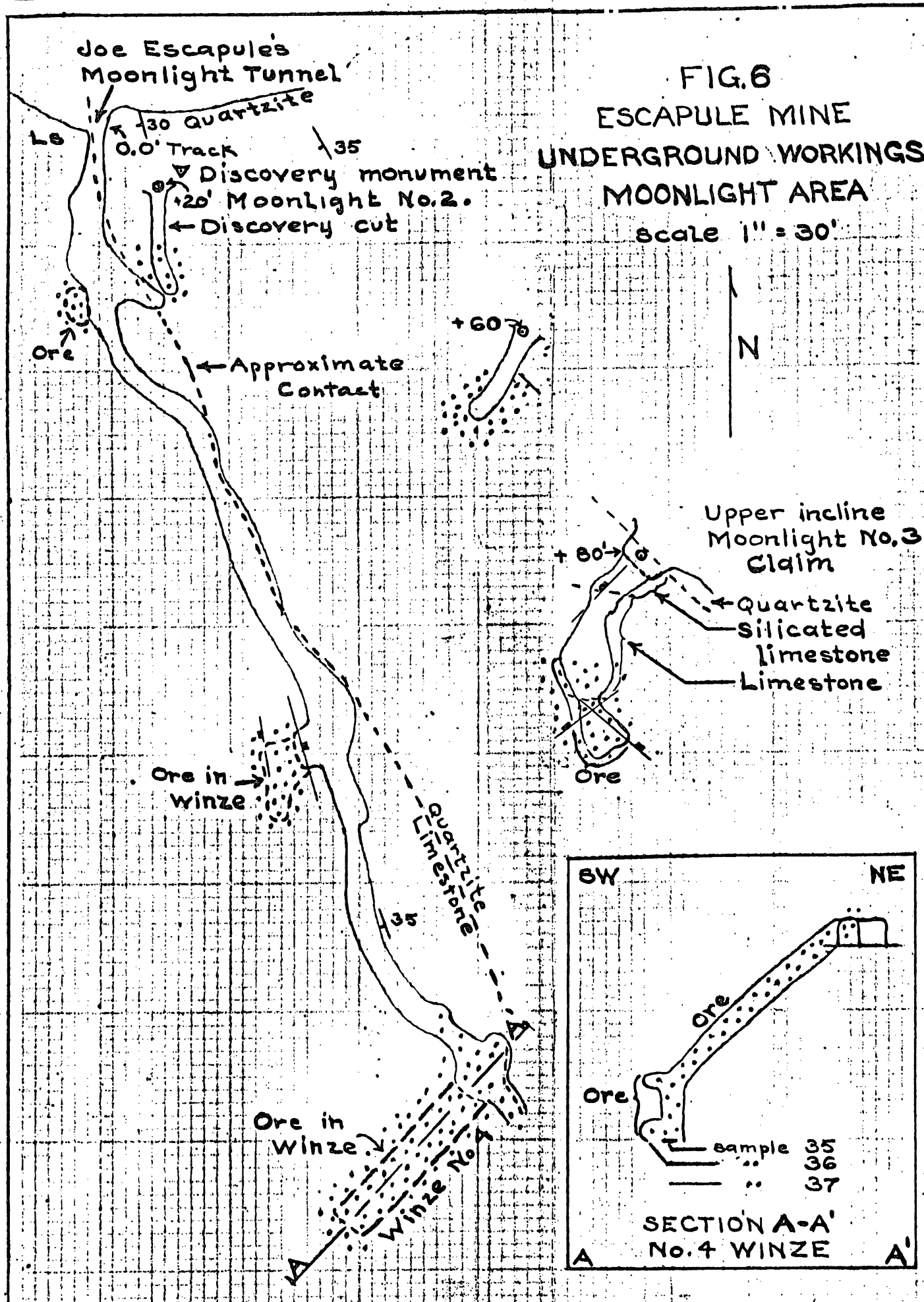


FIG. 6
ESCAPULE MINE
UNDERGROUND WORKINGS
MOONLIGHT AREA

Scale 1" = 30'

Mapped 1955, 1964

TABLE 1 - GENERALIZED SEQUENCE OF ROCKS IN THE MIDDLE PASS AREA

Age	Formation or Rock type	Description
Quaternary	Alluvium and Gila Conglomerate	Young sediments and volcanic flows.
- - Unconformity		
Tertiary	Igneous intrusions	Stronghold granite and related dikes, and Schieffelin granodiorite near Tombstone.
Cretaceous	Igneous intrusions and flows	Not observed in Middle Pass area.
- - Unconformity		
Cretaceous	Bisbee formation or group	Sandstone, mudstone and conglomerate several hundred feet thick; much faulted.
- - Unconformity		
Triassic-Jurassic	Igneous intrusives	Cochise Peak quartz monzonite and other intrusives at Tombstone and Gleeson.
Permian-Pennsylvanian Naco Group	Epitaph dolomite	Dolomite exposed only in thin fault slices; a few score feet thick.
Ditto	Colina limestone	Dark gray, fine grained limestone a few score feet thick; faulted.
Ditto	Earp formation	Limestone and shale several score feet thick; faulted.
Ditto	Horquilla limestone	Light gray to pink limestone some crinoidal beds; several hundred feet thick.
Mississippian	Escabrosa limestone	Massive crinoidal limestone several hundred feet thick.
Devonian	Martin limestone	Limestone, shale and sandstone; a few score feet thick; faulted.
Cambrian	Abrigo quartzite	Limestone, shale, sandstone and some edgewise conglomerate 636 feet thick.
Cambrian	Bolsa quartzite	Quartzite and conglomerate 300 feet thick.
- - Unconformity		
Precambrian	Basement rocks	Schist and gneissic granite.

TABLE 2 - LIST OF ASSAYS FROM MOONLIGHT WORKINGS - ESCAPULE MINE

Sample Number	Date	Assay Office	Sampled by	Gold oz./ton	Silver oz./ton	Copper Percent	Lead Percent	Zinc Percent	Total combined Lead, Zinc, Copper deposits
1	7/23/46	Shattuck-Denn	Higgins	0.01	14.60	-	4.75	11.20	15.95
2	"	"	"	0.01	2.40		13.30		
3	1/12/49	Gordon	Escapule	Tr.	6.62	Tr.	0.50	7.70	8.20
4	"	"	"	Tr.	0.18	Tr.	0.50	15.80	16.30
5	11/23/49	"	"	0.06	5.94	0.27	0.30	8.4	8.97
6	"	"	"	0.01	1.0	0.22	0.25	3.66	4.13
7	"	"	"	0.04	3.0	0.54	0.25	6.87	7.66
8	"	"	"	Tr.	2.6	0.41	0.80	7.35	8.57
9	10/4/50	"	"	0.12	46.80	0.30	0.44		
10	"	"	"					21.4	
11	10/22/50	"	"	Tr.	4.80		0.22	11.55	11.77
12	"	"	"	Tr.	3.20		0.20	4.20	4.40
13	"	"	"	0.02	1.20		0.30	3.98	4.20
14	"	"	"	0.02	24.20		5.85	4.80	10.65
15	"	"	"	Tr.	6.04		0.30	12.00	12.30
16	"	"	"	Tr.	1.20		0.25	9.15	9.40
17	"	"	"	Tr.	3.20		3.53	7.20	10.73
18	11/18/50	"	"	Tr.	4.08	6.5	1.04	21.0	22.04
19	12/12/50	"	"	0.02	52.00		11.10	22.50	33.60
20	"	"	"	0.06	50.20		11.10	22.70	33.80
21	Dec. 1950	ASARCO	"		5.00		4.5	10.0	14.50
22	5/10/54	Hawley	"	Tr.	5.2	0.42	4.6	6.2	11.22
23	2/12/55	Jacobs	Lamm	0.01	7.8	1.27	3.5	7.5	12.27
24	"	"	"	0.02	16.0	2.36	5.5	14.7	22.56
25	"	"	"	0.01	7.8	0.21	8.7	12.3	21.21
26	"	"	"	0.01	8.3	0.09	2.5	11.5	14.09
27	8/24/55	USBM	USBM	Tr.	3.4	0.21	1.7	5.1	7.01
28	"	"	"	Tr.	1.9	0.16	1.7	3.7	5.56

ECONOMIC GEOLOGY OF THE MINE AREAS

Moonlight Mine Area

The Escapule mine is situated on the Moonlight 2 and 3 claims near the nead of a small canyon that drains the steep north slope of Black Diamond Peak. The mine lies a couple hundred feet west of the Dragoon fault where beds of Cretaceous shale and sandstone on the east side are in contact with Paleozoic limestones on the west side of this west dipping fault.

The Escapule mine is developed on an ore zone which lies along a normal bedding contact between a footwall zone of fine grained sandstone or quartzite and a hanging wall of gray limestone. The strata strike about N. 20 degrees W. and dip about 35 degrees SW. The limestone is believed to be the Horquillo formation of the Naco group but the presence of sandstone suggests that it may represent the Earp formation. There is a possibility that the beds are overturned because the nearby Cretaceous beds are overturned along the Dragoon fault and the limestones may have participated in the same structural deformation. The limestone is a good host rock for replacement type ore bodies.

The Escapule mine is developed by an adit about 275 feet long and by four shallow winzes numbered consecutively from the portal of the adit. (See fig. 6). These shallow winzes were sunk to explore the downward extensions of ore exposed in the adit and are respectively about 10, 17, 25 and 70 feet deep. All of the underground workings were driven along or near the contact between the quartzite and the limestone referred to above. The strata appear to be slightly warped so that the 35 degree westerly dip is not uniform throughout the mine. The strata are also slightly broken by numerous small fractures and minor faults. Most of the faults seem to be nearly parallel to the strata in the adit but in the winzes the faults steepen and transect the strata at a small angle. One of the more obvious faults is exposed near the portal of the adit but none can be easily traced in the underground workings.

The lead-zinc-copper and silver ore bodies have formed by replacement of limestone just above the fine grained quartzite that forms the footwall of the ore zone. The ore minerals are principally sphalerite, galena and minor amounts of chalcopyrite. The manner in which the silver occurs is not yet known. The gangue minerals are principally lime-magnesia silicates occurring as greenish, radiating, elongate crystals which are assumed to be hedenbergite or hornblende. These lime-magnesia silicates form in a narrow zone that is more-or-less continuous along the base of the limestone or within a few feet of the underlying quartzite.

TABLE 3 - Description of samples indicated on Table 2
Moonlight workings Escapule Mine

No.	Description
1	25-foot incline shaft
2	Surface lead
3	Upper incline
4	Lower incline
5	Lower adit, 1 ft., Sample 3
6	" " 6 in., " 1
7	" " 3 ft., " 4
8	" " 2 ft.
9	Upper incline shaft
10	" " " , specimen
11	Lower adit, east side, down from winze
12	Ore in bin from face of lower adit and in winze at end
13	Ore in epidote gangue, $2\frac{1}{2}$ ft. picked
14	Upper incline shaft to east side
15	" " " " " " , $2\frac{1}{2}$ ft. picked siliceous ore
16	" " " , zinc ore picked from $2\frac{1}{2}$ ft. sample
17	Lower adit (?). Starts at truck level.
18	No description
19	Upper incline shaft, sulfide ore
20	" " " , carbonate and sulfide mixed
21	Mixed ore and waste in dump from lower adit
22	No description
23	Track level Lower adit
24	Winze, 4-ft. face, Lower adit
25	Winze, Lower adit
26	Upper shaft
27	Stockpile of ore on dump of main adit
28	Ore in bin, probably from No. 4 winze
29	Stockpile of ore on dump of main adit, from No. 4 mine
30	Hanging wall, lower adit, 2-ft.
31	" " " " 3-ft.
32	Clean ore collected from along ore zone, lower adit
33	Muck pile representing ore from No. 4 winze at depth of 37 to 41 feet, two feet above footwall
34	Muck pile representing ore from No. 4 winze at depth of 37 to 41 feet, hanging wall zone
35	Ore from 2 to 5 ft. west of No. 4 winze at depth of 62 feet
36	Hanging wall of No. 4 winze at depth of 62 feet
37	Stub crosscut in hanging wall of No. 4 winze, sample cut 10 ft. from foot wall of winze.

TABLE 2 - LIST OF ASSAYS FROM MOONLIGHT WORKINGS - ESCAPULE MINE - Cont'd

Sample Number	Date	Assay Office	Sampled by	Gold Oz./ton	Silver Oz./ton	Copper Percent	Lead Percent	Zinc Percent	Total combined Lead, Zinc, Copper Deposits
29	2/21/56	ASARCO	Escapule	Tr.	2.5	0.34	1.74	4.67	6.84
30	7/17/59	Valley Lab.	"	0.02	10.80	4.25	14.4	7.3	25.95
31	"	"	"	0.02	4.10	3.7	7.3	3.6	14.60
32	12/28/62	Arizona Testing Lab.	Consolidated Minerals,Inc.	0.04	19.6	1.8	15.7	17.8	35.30
33	3/14/63	Jacobs	Faick and Escapule		4.2	0.14	2.8	4.3	7.24
34	"	"	"		9.2	0.48	5.3	8.0	13.78
35	12/6/64	-	Escapule		1.96	0.32	0.44	5.9	6.66
36	"	-	Faick and Higgins		1.56	0.14	0.98	6.85	7.97
37	"	-	"		6.25	0.13	3.46	7.05	10.64
Arithmetic average of above assays from Moonlight No. 1 workings				0.02	9.43	1.10	3.88	9.28	

TABLE 2 - LIST OF ASSAYS FROM MOONLIGHT WORKINGS - ESCAPULE MINE - Cont'd

Sample Number	Date	Assay Office	Sampled by	Gold Oz./ton	Silver Oz./ton	Copper Percent	Lead Percent	Zinc Percent	Total combined Lead, Zinc, Copper Deposits
29	2/21/56	ASARCO	Escapule	Tr.	2.5	0.34	1.74	4.67	6.84
30	7/17/59	Valley Lab.	"	0.02	10.80	4.25	14.4	7.3	25.95
31	"	"	"	0.02	4.10	3.7	7.3	3.6	14.60
32	12/28/62	Arizona Testing Lab.	Consolidated Minerals, Inc.	0.04	19.6	1.8	15.7	17.8	35.30
33	3/14/63	Jacobs	Faick and Escapule		4.2	0.14	2.8	4.3	7.24
34	"	"	"		9.2	0.48	5.3	8.0	13.78
35	12/6/64	-	Escapule		1.96	0.32	0.44	5.9	6.66
36	"	-	Faick and Higgins		1.56	0.14	0.98	6.85	7.97
37	"	-	"		6.25	0.13	3.46	7.05	10.64
Arithmetic average of above assays from Moonlight No. 1 workings				0.02	9.43	1.10	3.88	9.28	

The ore minerals occur as disseminations and as small masses in the lime silicates and as small replacement bodies in the limestone above the silicate zone. The ore bodies seem to be somewhat tabular, more-or-less parallel to the bedding planes of the limestone. Escapule has observed that the ore seems to occur in elongate, pod-like ore bodies which pitch at a low angle toward the south. He has observed that the ore bodies have increased in size as he drove the adit from north to south. Likewise the size of the ore bodies apparently increases with increasing depth of the winzes. These observations seem to be perfectly valid for the mine as presently developed, however, geological reasons for the apparent increase in the size of the ore bodies are as yet unknown.

The metal content of the ore in the Moonlight workings is indicated by assays of 37 samples represented by 161 separate determinations for which Escapule has most of the assay certificates. These assays span the years from 1946 thru 1964. The assays are shown in table 2 and the descriptions that are available are given in table 3. The arithmetic average metal content of the samples shown in table 2 is as follows:

9.43 oz. silver/ton	9.28 percent zinc
0.02 oz. gold/ton	3.88 " lead
	1.10 " copper

In addition to the main adit and winzes there is a shallow inclined shaft about 180 feet southeast of the portal of the adit. The arithmetic average of 13 samples collected from various places in the inclined shaft showed a metal content as follows:

8.45 oz. silver per ton	9.41 percent zinc
0.01 oz. gold per ton	2.67 percent lead
	1.57 percent copper

Undoubtedly the above assays show the effect of a certain amount of sample selectivity and the indicated average probably is higher than mine run ore. From long experience with the ore Escapule estimates that it contains about as follows:

3.0 oz. silver per ton	8.0 percent zinc
0.01 oz. gold per ton	3.0 percent lead
	0.8 percent copper

In this estimate the silver content appears to be too low as indicated by a large number of assays. Assays representing about 50 samples of ore from the Moonlight workings have a ratio of about 1 ounce of silver to about 1 percent zinc and 1 ounce of silver to each 0.35 percent lead. The silver content of the ore from the Moonlight workings is higher than is usually found in this type of ore.

Silver Mine Area

Located about one mile southwest of the Moonlight mine and extending north about 3,500 feet from the Silver Cloud mine (see fig. 2 and 3) is an area where considerable silver has been

20 or 30 years. About 235 samples represented by about 541 individual assays can be accounted for on old records compiled principally by Gordon. Presumably most of these represent choice, select material sampled for specific purposes of finding ore bodies that could be mined at the time of sampling, but the samples indicate that a relatively large area is mineralized and that impressive amounts of silver with some gold occurs in several different types of host rock.

A study of the descriptions of the Gordon samples reveals that a variety of materials are mineralized. Significant gold and silver values are reported in quartz veins, siliceous zones, layers of limestone, brecciated and recemented limestone; white, pink and bluish limestone; red and brown iron oxides, galena, sphalerite lead and zinc carbonates. Apparently ore bearing materials penetrated the host rocks on an extensive scale and left small rich concentrations of silver with minor amounts of gold, lead and zinc scattered throughout a large zone.

On a list of samples and assays compiled by Gordon in 1932, which includes assays as old as January 1920, about 138 samples were grouped according to the claims from which they were collected. This list provides information concerning the amount and distribution of metals as known in 1932 but more recent information has not been correlated with the Gordon record. Distribution of the assays suggest that there is an anomalous high silver content in the limestones in an irregular area about 3,500 feet long and about 2,000 feet wide as sketched on the claim map, figure 3. The sample distribution by claims and the average amount of gold and silver in the assays reported by Gordon is shown in table 4, and figure 3 shows the locations as closely as can be determined.

Table 4. Average assays on the Arizona claims.

Claim	No. of samples represented	Average oz. gold per ton	Average oz. silver per ton	Ratio Oz. gold: Oz. silver
Arizona 1	26	0.25	10.63	1:42
" 3	30	0.14	17.01	1:121
" 4	5	0.03	25.30	1:843
" 5	9	0.08	25.80	1:360
" 6	12	0.20	16.98	1:85
" 7	19	0.26	7.7	1:30
" 8	16	0.07	19.20	1:274
" 13	23	0.11	37.80	1.344

The available assay records show that the ore locally contains erratically high values; one assay showed 3.33 ounces of gold and 405 ounces of silver per ton. In averaging Gordon's assays all those over 0.7 ounces per ton in gold and 70 ounces of silver were discarded. This procedure is of doubtful merit as indicated by five samples on the Arizona 4 claim which averaged 0.45 ounces of gold but only averaged 0.03 ounces after discarding the erratic high assays. Discarding exceptionally high assays for both gold and silver also gave questionable results for the average assays reported for Arizona 6 and 3 claims. The ratio of gold to silver as shown in the preceeding table is too erratic to be significant, however, it does emphasize the high proportion of silver.

A short field examination and the assay records reported in tables 5 and 6 indicate that the ore zone on the Garnet 8 claim contains considerable zinc, lead, silver and a little cadmium. The zinc is nearly iron free "resin jack" and when milled should yield a concentrate containing more than 50 percent zinc. The silver to zinc ratio is about 1 ounce silver to 1 percent zinc and the silver to lead ratio is about 1 ounce silver to 0.2 percent lead. These ratios have about the same order of magnitude as the metal ratios at the Moonlight workings.

ORE RESERVES AND FUTURE ORE DISCOVERIES.

Exposed in the adit and winzes of the Moonlight mine is a small reserve of proven and probable ore; probably on the order of 5,000 tons. This is based on a depth of about 70 feet below the adit, a width of about 20 feet at the bottom of winze 4, and an assumed strike length of about 30 feet. Also, there is ore exposed in the other winzes, in a number of places in the adit and in the surface workings above the adit, therefore, there is considerable material that should be classified as possible ore. The writer estimates the grade of this ore to be about as follows:

8.0 oz. silver per ton	8.0 percent zinc
0.01 oz. gold per ton	3.0 percent lead
	0.8 percent copper

There are a few hundred tons of zinc-lead-silver ore indicated on the Garnet 8 claim and the possibilities of finding additional ore are excellent. The Silver mine area is thought to contain considerable silver ore suitable for open pit mining but it is not practical to estimate the reserves from the information now available.

Far more important than the small amount of ore showing in the present mine workings is the possibility of finding ore to the south and west, and also a few hundred feet north of the Moonlight workings. As pointed out in the structural section of this report the entire limestone block in the hanging wall of the Dragoon fault has been structurally deformed so that it is favorable for ore deposition. The writer is optimistic about finding considerable ore in this block of limestone because of the good silver-lead-zinc ore exposed on the Moonlight and Garnet 8 claims, the large silver-bearing area near the old Silver Cloud mine and the copper-iron ore at the Black Diamond mine. The limestone in the hanging wall of the Dragoon fault probably is favorable for the occurrence of ore for a long distance, possibly a couple of miles, south of the Moonlight Mine and for a considerable distance west of the outcrop of the fault. This is a geologically favorable area which warrants considerable exploration for ores of silver, copper, lead znd zinc, and the writer believes important ore discoveries will be made in this zone.

The footwall of the Dragoon fault may also contain replacement type ore bodies because it is chiefly limestone conglomerate for

long distance according to Gilluly (1956, p. 143), and this would be favorable for mineralization.

If exploration is successful in finding additional ore bodies like those at the Moonlight mine they probably would have to be mined by underground methods, but silver ore like that on the Garnet group of claims may be suitable for medium to large scale open pit mining.

SUGGESTED EXPLORATION

The Escapule property, consisting of the Moonlight, Northside and Garnet groups of claims, has been thoroughly prospected during the last 50 years, especially since World War II. This work has demonstrated conclusively that the property is well mineralized and it justifies a well planned and carefully executed exploration program. This should consist of detailed geological mapping followed by geochemical and geophysical surveys and by exploration drilling. Such exploration work should be conducted on the limestones in the hanging wall of the important Dragoon fault and the exploration effort should extend at least a couple of miles south of the Moonlight mine and westward to the foot of the Dragoon Mountains.

REFERENCES

Gilluly, James, Cooper, J. R., and Williams, J. S., Late Paleozoic stratigraphy of central Cochise County, Arizona, U. S. Geol. Survey, Prof. Paper 266, 1954.

Gilluly, James, General geology of central Cochise County, Arizona; U. S. Geol. Survey Prof Paper 281, 1956.

Wilson, E. D., Central Dragoon Mountains area, in Arizona Zinc and Lead Deposits, Arizona Bur of Mines Bull No. 158, p. 20-28, 1951. (This report describes the Abril and San Juan mines and mentions the Escapule mine).

10-8-69

TO Dr. John N. Faick
Mine Exploration Company, Inc.
3130 E. Grant Road
Tucson, Arizona 85716

HEINRICHS GEOEXPLORATION COMPANY
808 W. GRANT ROAD - P. O. BOX 5671
TUCSON, ARIZONA 85703
Area Code 602 Phone 623-0578
Geophysical Exploration Research Engineering

SUBJECT: Preliminary Report - Cochise County, Arizona DATE: 11/3/69

2ND FOLD

Dear John:

Thank you for allowing us to study the enclosed report.

The situation is under consideration and we will advise if, as and when favorable to proceed further. Let us know when this is no longer available.

Sincerely yours,

HEINRICHS GEOEXPLORATION COMPANY

Walter E. Heinrichs, Jr.
President

WEHjr/md

Enclosure - Report

1ST FOLD

PLEASE REPLY TO ——→ SIGNED

DATE SIGNED

SEND WHITE AND PINK COPIES WITH CARBON INTACT. PINK COPY IS RETURNED WITH REPLY.

DETACH THIS COPY–RETAIN FOR ANSWER

Faick

11/3/69

Gloss

Don Corley

Walt recommends copying report & [redacted] return original to Faick saying "situation under consideration & will advise if favorable.

Meanwhile we consider: Shaw? yes*

Johnson? No*

Other? who*?

None for now.

*[illegible]

W.

New folder.

MINE EXPLORATION CO., INC.

3130 E. GRANT RD., TUCSON, ARIZONA 85716

JOHN N. FAICK, Ph.D.
Mining Geologist
Arizona Register No. 6352

TELEPHONE (602) 325-7123
(602) 325-2312

August 27, 1969

Mr. Walter Heinrichs
Heinrichs Geoexploration Co.
P. O. Box 5671
Tucson, Arizona 85703

P.O. BOX 5671 TUCSON, ARIZONA 85703
Phone (AREA CODE) 623-0578

Dear Walt:

We believe the property briefly described on the attached information sheet will be of interest to your company.

For a complete geological report and/or inspection trip to the property contact our office.

Check Quad & get
Comments: Grover
Don, Let's look @ it
(the report that is)
D.O.C.

Sincerely yours,

John N. Faick

John N. Faick

Jan of Phillips: Please phone Faick for copy of report the mentions to review at our convenience & return to him. Depending on length we can assign someone, (or Jean stage up) a half-hour or so, or almost any given consecutive day or two as necessary. Then we will let him know of our possible next.

KW

PROPERTY SUMMARY

Contact:- John N. Faick (602) 325-7123
Mine Exploration Co., Inc. (602) 325-2312
3130 East Grant Road
Tucson, Arizona 85716
or Walter Lautz (602) 327-7524

Brief Description:- A group of 17 unpatented mining claims owned by Joe M. Escapule, of Tombstone, Arizona, is situated about 12 miles northeast of this famous old silver mining community. The claims cover three mineralized zones, two of which have been developed by a few hundred feet of mine workings. About 5,000 tons of good quality zinc-lead-silver ore has been developed by the underground workings known as the Moonlight mine, and about one mile west-southwest of it nearly similar ore is exposed in small prospects on the Garnet 8 claim. Extending south of this claim for a distance of about one-half of a mile, and adjoining the old silver Cloud mine is an extensive zone in which assays on 235 samples indicate rich silver ore in small lenses, pods and veinlets widely distributed throughout an extensive block of limestone.

The zinc-lead-silver deposits on Joe Escapule's claims are sufficiently large and rich to justify further exploration with reasonable expectations of finding considerable ore suitable for underground mining. The silver-bearing area may contain enough silver throughout a sufficiently large zone to be mined by modern open pit methods. It should be explored with this as an objective.

Available:- We are prepared to show the claims to interested parties at any convenient time.

21 Oct. 1969

John K.

To Grover &/or Walt

Date 21 Oct. '69 Time 10:15 AM.

WHILE YOU WERE OUT

M John Faick

of

Phone
Area Code Number Extension

TELEPHONED		PLEASE CALL	
CALLED TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		URGENT	
RETURNED YOUR CALL			

Message Has some land of possible interest to you. Call upon your return.
Res. 325-2312 Off - 325-7123

plp
Operator

No. 2725 S Clark Office Products Phone 298-2374

INDUCED POLARIZATION - RECEIVER NOTES (125) PAGE _____

Project: MINES EX. INC. Line: 9 Sp 2 5½ Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec. 250-	3755	375-500→		500-625 S		→	625-750 S			→		
Time	1000	1000	100	1000	300	100	300	100	100	30		
DC-1	306 306	319 319	61.8 61.8	248 247	63 65	21.9 23.0	209 206	49.0 50.5	24.3 23.4	11.6 10.85		
DC-2	306 306	319 319	61.8 61.8	248 247	63 65	21.9 23.0	209 206	49.0 50.5	24.3 23.4	11.6 10.85		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	612	638	123.6	495	128	44.9	415	99.5	47.7	22.45		
AC-1	301	314	60.8	243	63.0	22.2	204.5	49.6	23.8	11.1		
AC-2	301	314	60.8	243	63.0	22.2	204.5	49.6	23.8	11.1		
Σ	602	628	121.6	486	126	44.4	409	99.2	47.6	22.2		
S. P.	13.9	-18.4		+24.8			-22.0					
AC-N	.02	.02		.02			.03					
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Mines Ex. Inc Line: 9 Sp2 5½ (125) Int.Cal _____ Date: _____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
Rec.	750-875 5	→	→	→	875-1000	→	→	→		1-2		
Time	100	100	30	30	100	30	30	10		300		
DC-1	54.4 53.8	26.4 25.8	16.6 16.1	8.4 8.0	28.0 28.2	17.1 16.6	11.4 10.6	6.20 5.94		99 99		
DC-2	54.4 53.8	26.4 25.8	16.6 16.1	8.4 8.0	28.0 28.2	17.1 16.6	11.4 10.6	6.20 5.94		99 99		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	108.2	52.2	32.7	16.4	56.2	33.7	22.0	12.14		198		
AC-1	53.6	25.9	16.2	8.10	28.0	16.7	10.95	6.02		99.5		
AC-2	53.6	25.9	16.2	8.10	28.0	16.7	10.95	6.02		99.5		
Σ	107.2	51.8	32.4	16.2	56.0	33.4	21.9	12.04		199		
S. P.	110.2				-13.0							
AC-N	.02				.03							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX, INC. Line: 9 Sp 2 N½ (125) Int.Cal _____ Date: 1-23-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec. 250	-125	125-0	→	0-125N	→	→	125N-250N	→	→	→		
Time	1000	1000	100	1000	100	100	300	100	30	30		
DC-1	333 322	297 296	60.2 59.8	226 227	56.6 57.6	24.2 25.4	168 168	39.7 39.8	18.15 18.00	10.10 9.85		
DC-2	333 322	297 296	60.2 59.8	226 227	58.6 57.6	24.2 25.4	168 168	39.7 39.8	18.15 18.00	10.10 9.85		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	655	593	120	453	114.2	49.6	336	79.5	36.15	19.95		
AC-1	320	286	59.3	224	56.4	24.5	165.5	39.2	18.0	9.90		
AC-2	320	286	59.3	224	56.4	24.5	165.5	39.2	18.0	9.90		
Σ	640	572	118.6	448	112.8	49.0	331.0	78.4	36.0	19.8		
S. P.	+23.1	-12.1		-14.0			+21.9					
AC-N	.03	.02		.03			.02					
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX, INC. Line: 9 Sp 2 N 1/2 (125) Int.Cal _____ Date: _____

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal,		
Rec.	250-3	5N	→	→	375-	500N	→	→		4-5		
Time	100	100	30	30	30	30	30	10		300		
DC-1	45.0 44.3	20.0 20.3	11.1 10.8	6.65 6.60	18.9 18.9	11.2 11.3	6.9 6.7	4.65 4.38		100 100		
DC-2	45.0 44.3	20.0 20.3	11.1 10.8	6.65 6.60	18.9 18.9	11.2 11.3	6.9 6.7	4.65 4.38		100 100		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	89.3	40.3	21.9	13.25	37.8	22.5	13.6	9.03		200		
AC-1	44.3	20.0	10.9	6.60	18.75	11.1	6.70	4.46		100		
AC-2	44.3	20.0	10.9	6.60	18.75	11.1	6.70	4.46		100		
Σ	88.6	40.0	21.8	13.2	37.5	22.2	13.4	8.92		200		
S. P.	±7.4				±0.9							
AC-N	.02				.02							
Pot.Res.												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project MINES EX. INC. Line 9 SD 2 N 1/2 (125') Field date 1-23-67 Data page_____ Comp. date 1-23-67. Comp by R.P.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive 250-	125 S →	125 – 0	→	0 – 125 N	→	→	125 – 250 N	→	→	→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	1	→	→	→	→	→	→	→	→	→		
(E) Vdc (avg)	655	593	120	453	114.2	49.6	336	79.5	36.15	19.95		
(F) DCcal	.500											
(G) Kn x 10^{-3}	.375	.375	1.5	.375	1.5	3.75	.375	1.5	3.75	7.5		
(H) ρ dc=ExFxGx10^3/D	123	112	90	85	86	94	63	60	68	75		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	640	572	118.6	448	112.8	49.0	331	78.4	36.0	19.8		
(L) AC-DC cal.	1.000											
(M) ρ dc/ρac=ExL/K	1.022	1.036	1.012	1.011	1.014	1.013	1.014	1.014	1.004	1.007		
(N) PFE=(M-1)(10^2)	2.2	3.6	1.2	1.1	1.4	1.3	1.4	1.4	0.4	0.7		
(O) MCF=(M-1)(10^5)/H	18	32	13	13	16	14	22	23	6	9		
S.P.	+23.1	-12.1		-14.0			+21.9					

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal.		
(B) Receive	250 – 375 N	→	→	→	375 – 500 N	→	→	→		4-5		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	1	→	→	→	→	→	→	→		1		
(E) Vdc (avg)	89.3	40.3	21.9	13.25	37.8	22.5	13.6	9.03		200		
(F) DCcal	.500											
(G) Kn x 10^{-3}	1.5	3.75	7.5	13.125	3.75	7.5	13.125	21.0				
(H) ρ dc=ExFxGx10^3/D	67	76	83	87	71	85	89	95				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	88.6	40.0	21.8	13.2	37.5	22.2	13.4	8.92		200		
(L) AC-DC cal.	1.000											
(M) ρdc/ρac =ExL/K	1.007	1.008	1.004	1.003	1.008	1.013	1.013	1.012				
(N) PFE=(M-1)(10^2)	0.7	0.8	0.4	0.3	0.8	1.3	1.3	1.2				
(O) MCF=(M-1)(10^5)/H	10	11	5	3	11	15	15	13				
S.P.	+7.4				+0.9							

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page _____

Project MINES EX. INC. Line 9 Sp2 S/2 (125') Field date 1-23-67 Data page 1 Comp. date 1-23-67. Comp by R.P.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive 250-	375 S →	375-500 S →		500-625 S →		→	625-750 S →			→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	1 →									→		
(E) Vdc (avg)	612	638	123.6	495	128	44.9	415	99.5	47.7	22.45		
(F) DCcal	.505											
(G) Kn x 10^{-3}	.375	.375	1.5	.375	1.5	3.75	.375	1.5	3.75	7.5		
(H) ρdc=ExFxGx10^3/D	116	121	94	94	97	85	79	75	90	85		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	602	628	121.6	486	126	44.4	409	99.2	47.6	22.2		
(L) AC-DC cal.	1.005											
(M) ρ dc/ρac=ExL/K	1.022	1.019	1.021	1.021	1.020	1.013	1.018	1.008	1.007	1.017		
(N) PFE=(M-1)(10^2)	2.2	1.9	2.1	2.1	2.0	1.3	1.8	0.8	0.7	1.7		
(O) MCF=(M-1)(10^5)/H	19	16	22	22	21	15	23	11	8	20		
S.P.	+3.9	-18.4		+24.8			-22.0					

Project _____ Line _____ Field date _____ Data page _____ Comp. date _____ Comp by _____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
(B) Receive	750-875 S →			→	875-1000 S →			→		1-2		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	1 →							→		1		
(E) Vdc (avg)	108.2	52.2	32.7	16.4	56.2	33.7	22.0	12.14		198		
(F) DCcal	.											
(G) Kn x 10^{-3}	1.5	3.75	7.5	13.125	3.75	7.5	13.125	21				
(H) ρ dc=ExFxGx10^3/D	82	99	124	109	106	128	146	129				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	107.2	51.8	32.4	16.2	56.0	33.4	21.9	12.04		199		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.013	1.012	1.013	1.016	1.008	1.014	1.008	1.011				
(N) PFE=(M-1)(10^2)	1.3	1.2	1.3	1.6	0.8	1.4	0.8	1.1				
(O) MCF=(M-1)(10^5)/H	16	12	10	15	8	11	5	9				
S.P.	+10.2				-13.0							

INDUCED POLARIZATION SENDER NOTES

project: Mines EX Line: 3 Spread (N½ Date: 1-26-62

Send	1-2	2-3	1-2	3-4	2-3	1-2	4 5	3 4	2 3	1 2		
Receive	→	→	→	←		→	→			→		
Time		—										
Range												
Current	1	1	1	1	1	1	1	1	1	1		
Send	4 5	3 4	2 3	1-2	4 5	3 4	2 3	1 2		CAL	4-5	
Receive	→			→	→			→				
Time												
Range												
Current	1	1	1	1	1	1	1	1			1	

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: Mines Ex. Inc Line: 9 S 250 1 S 1/2 Int.Cal _____ Date: _____

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-250	250-500 →		500-750 →			750-1000 →					
Time	300	300	100	300	100	30	300	100	30	30		
DC-1	90.6 91.0	108 107	28.8 27.4	125 125	33.0 32.3	12.0 13.1	124.5 124.0	40.5 42.0	16.7 18.3	7.90 7.10		
DC-2	90.6 91.0	108 107	28.8 27.4	125 125	33.0 32.3	12.0 13.1	124.5 124.0	40.5 42.0	16.7 18.3	7.90 7.10		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	181.60	215.	56.2	250	65.3	25.1	248.5	82.50	35.0	15.0		
AC-1	90.2	106	27.8	123	32.3	12.45	121.5	40.6	17.3	7.45		
AC-2	90.2	106	27.8	123	32.3	12.45	121.5	40.6	17.3	7.45		
Σ	180.4	212	55.6	246	64.6	24.90	243.	81.2	34.6	14.90		
S. P.	+14.0	-18.1		+0.6			-3.8					
AC-N	.02	.02		.02			.02					
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINE Ex INC Line: 9 Sol 5½ (250) Int.Cal _____ Date: _____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		1-2		
Time	100	30	30	10	30	30	10	10		300		
DC-1	33.4 33.8	15.5 14.65	7.75 6.90	3.68 3.65	14.2 14.35	7.3 7.4	4.04 4.42	2.04 2.46		100 100		
DC-2	33.4 33.8	15.5 14.65	7.75 6.90	3.68 3.65	14.2 14.75	7.3 7.4	4.04 4.42	2.04 2.46		100 100		
Σ	67.2	30.1	14.65	7.33								
DC-3												
Dc-4												
Σ												
DC-AV	67.2	30.15	14.65	7.33	28.55	14.70	8.46	4.50		200		
AC-1	33.4	15.0	7.25	3.63	14.2	7.26	4.18	2.22		100		
AC-2	33.4	15.0	7.25	3.63	14.2	7.26	4.18	2.22		100		
Σ	66.8	30.	14.5	7.26	28.4	14.52	8.36	4.44		200		
S. P.	47.4				+6.5							
AC-N	.02				.03							
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES (250) PAGE _____

Project: Mines Ex Inc Line: 9 Sp 1 N 1/2 Int.Cal _____ Date: 1-23-67

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-250	250-500	0 →	500-750	→	→	750-1000	→	→	→		
Time	300	300	100	300	100	30	300	100	30	10		
DC-1	110 110	95.5 95.5	29.8 28.4	144 145	27.4 27.2	12.05 13.55	151 151	25.4 24.4	9.85 8.60	5.64 5.56		
DC-2	110 110	95.5 95.5	29.8 28.4	144 145	27.4 27.2	12.05 13.55	151 151	25.4 24.4	9.85 8.60	5.64 5.56		
Σ												
DC-3												
Dc-4												
Σ												
DC-AV	220	191.	58.2	289	54.6	25.60	302	49.8	18.45	11.20		
AC-1	108.5	95.0	29.0	142	26.9	12.65	148	24.4	9.10	5.54		
AC-2	108.5	95.0	29.0	142	26.9	12.65	148	24.4	9.10	5.54		
Σ	217.0	190.0	58.0	284	53.8	25.30	296	48.8	18.20	11.08		
S. P.	+1.6	+7.9		-24.7			-8.7					
AC-N	.02	.02		.02			.03					
Pot.Res.												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: MINES EX INC Line: 9 Sp1 N½ (250) Int.Cal _____ Date: _____

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal.		
Rec.	1000-1250	→	→	→	1250-1500	→	→	→		4-5		
Time	100	30	10	10	30	30	10	10		300		
DC-1	20.7 21.0	7.4 7.8	4.12 3.62	2.60 2.50	14.0 14.0	6.20 6.60	4.06 3.18	3.04 1.96		100 100		
DC-2	20.7 21.0	7.4 7.8	4.12 3.62	2.60 2.50	14.0 14.0	6.20 6.60	4.06 3.18	3.04 1.96		100 100		
Σ												
DC-3												
Dc-4												
Σ	41.7	15.2	7.74	5.10	28.0	12.80	7.24	5.0		200		
DC-AV												
AC-1	20.5	7.50	3.83	2.54	13.8	6.30	3.58	2.47		100		
AC-2	20.5	7.50	3.83	2.54	13.8	6.30	3.58	2.47		100		
Σ	41	15.0	7.66	5.08	27.6	12.60	7.16	4.94				
S. P.	-3.5				+2.9							
AC-N	.02				.02							
Pot.Res.												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project MINES EX. INC. Line 9 Sp 1 5½ (250') Field date 1-23-67 Data page_____ Comp. date_____. Comp by R.P.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive	0-250	250-500	→	500-750	→	→	750-1000	→	→	→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	1	→	→	→	→	→	→	→	→	→		
(E) Vdc (avg)	181.6	215	56.2	250	65.3	25.1	248.5	82.5	35.0	15.0		
(F) DCcal	.500											
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15.0		
(H) ρ dc=ExFxGx10^3/D	67	81	94	94	109	94	93	133	131	125		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	180.4	212	55.6	246	64.6	24.90	243	81.2	34.6	14.9		
(L) AC-DC cal.	1.000											
(M) ρ dc/ρac=ExL/K	1.006	1.014	1.011	1.016	1.010	1.008	1.032	1.016	1.011	1.007		
(N) PFE=(M-1)(10^2)	0.6	1.4	1.1	1.6	1.0	0.8	3.2	1.6	1.1	0.7		
(O) MCF=(M-1)(10^5)/H	9	17	12	17	9	9	32	12	8	6		
S.P.	+14.0	-18.1		+0.6			-3.8					

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		cal.		
(B) Receive	1000-1250	→	→	→	1250-1500	→	→	→		1-2		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	1	→	→	→	→	→	→	→		1		
(E) Vdc (avg)	67.2	30.15	14.65	7.33	28.55	14.7	8.46	4.50		200		
(F) DCcal												
(G) Kn x 10^{-3}	3	7.5	15.0	26.25	7.5	15	26.25	42.0				
(H) ρ dc=ExFxGx10^3/D	112	113	123	96	108	123	111	94				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	66.8	30.0	14.5	7.26	28.4	14.52	8.36	4.44		200		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.008	1.006	1.011	1.011	1.003	1.012	1.012	1.013				
(N) PFE=(M-1)(10^2)	0.8	0.6	1.1	1.1	0.3	1.2	1.2	1.3				
(O) MCF=(M-1)(10^5)/H	7	5	9	11	3	10	11	14				
S.P.	+7.4				+6.5							

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page _____

Project Mines Ex Inc Line 9 SP.1, NE Field date 1-23 67 Data page _____ Comp. date 1-25.67. Comp by P.B.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	0-250	250 —	500	500 —		750	750 —			1000		
(C) n separation	.75	.75	32	.75	32	3	.75	2	3	4		
(D) I	1									→		
(E) Vdc (avg)	220	191.	58.2	289.	54.6	25.60	302	49.8	18.45	11.20		
(F) DCcal	.50									→		
(G) Kn x 10^{-3}	.175	.175	3.0	.175	3.0	7.5	.175	3.0	7.5	15.0		
(H) ρ dc=ExFxGx10^3/D	82.6	71.5	87.	108.3	82.	96	113	75.	69.2	84.2		
(I) Vac Σ	217	190	58	284	53.8	25.30	296	48.8	18.2	11.08		
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1											
(M) ρ dc/ρac=ExL/K	1.014	1.004	1.005	1.020	1.015	1.011	1.018	1.021	1.013	1.012		
(N) PFE=(M-1)(10^2)	1.4	0.4	0.5	2.0	1.5	1.1	1.8	2.1	1.3	1.2		
(O) MCF=(M-1)(10^5)/H	17	6	6	2	18	11	14	28	19	14		

Project _____ Line _____ Field date _____ Data page _____ Comp. date _____ Comp by _____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2.		col 4-5		
(B) Receive	1000			1250	1250 —			1500				
(C) n separation	32	7.3	1.4	5	3	4	5	6				
(D) I	1							→				
(E) Vdc (avg)	41.7	15.2	7.74	5.10	28.0	12.80	7.24	5.0		200		
(F) DCcal	.5							→				
(G) Kn x 10^{-3}	3.0	7.5	15.0	26.25	7.5	15.0	26.25	42.0				
(H) ρ dc=ExFxGx10^3/D	62.6	57.2	58.0	67.0	105	96.	95	105				
(I) Vac Σ	41.	15	7.66	5.08	27.6	12.60	7.16	4.94		200		
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1											
(M) ρdc/ρac =ExL/K	1.018	1.012	1.009	1.004	1.013	1.015	1.010	1.011				
(N) PFE=(M-1)(10^2)	1.8	1.2	0.9	0.4	1.3	1.5	1.0	1.1				
(O) MCF=(M-1)(10^5)/H	29	21	17	6	12	15	10	10				

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project MINE EX. INC. Line 3 Sp 2 N½ Field date 1-21-67 Data page_____ Comp. date_____. Comp by R.P.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive 1750	- 2000N	2000 - 2250 →		2250 - 2500 →		→	2500 - 2750 →			→		
(C) n separation	1	1	2	1	2	3	1	2	3	4		
(D) I	1.5	1.5	1.5	1 →						→		
(E) Vdc (avg)	163.5	152.4	51.6	125.6	38.6	18.9	161.5	48.6	20.9	12.4		
(F) DCcal	.500											
(G) Kn x 10^{-3}	.75	.75	3	.75	3	7.5	.75	3	7.5	15.0		
(H) ρ dc=ExFxGx10^3/D	41	38	52	47	58	71	61	73	78	93		
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	163.0	152.4	51.6	125.2	39.0	18.8	161.0	48.2	21.1	12.40		
(L) AC-DC cal.	1.000											
(M) ρ dc/ρac=ExL/K	1.003	1.000	1.000	1.003	.990	1.005	1.003	1.008	.991	1.000		
(N) PFE=(M-1)(10^2)	0.3	0.0	0.0	0.3	-1.0	0.5	0.3	0.8	-0.9	0.0		
(O) MCF=(M-1)(10^5)/H	7	0	0	6	-17	7	5	11	-12	0		
S.P.	-1.1	-7.4		-16.3			-2.5					

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		cal.		
(B) Receive	2750 - 3000 →			→	3000 - 3250 →			→		4-5		
(C) n separation	2	3	4	5	3	4	5	6				
(D) I	1 →							→		1		
(E) Vdc (avg)	56.0	24.3	12.6	8.41	24.0	12.7	7.69	5.30		200		
(F) DCcal												
(G) Kn x 10^{-3}	3	7.5	15.0	26.25	7.5	15.0	26.25	42.0				
(H) ρ dc=ExFxGx10^3/D	84	91	95	110	90	95	101	111				
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	56.0	24.4	12.6	8.44	24.0	12.8	7.70	5.32		200		
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K	1.000	.996	1.000	.996	1.000	.992	.999	.996				
(N) PFE=(M-1)(10^2)	0.0	0.4	0.0	-0.4	0.0	-0.8	-0.1	-0.4				
(O) MCF=(M-1)(10^5)/H	0	4	- 0	- 4	0	- 8	- 1	- 4				
S.P.	+9.0				-10.5							